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S. Sarmast, J. M. Schussler, J. M. Ko, and W. C. Roberts

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Clinical research studies enrolling patients through Baylor Research Institute

Currently, Baylor Research Institute is conducting more than 800 research projects. Studies open to enrollment are listed in the Table. To learn more about a study or to enroll patients, please call or e-mail the contact person listed.

<table>
<thead>
<tr>
<th>Research area</th>
<th>Specific disease/condition</th>
<th>Contact information (name, phone number, and e-mail address)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asthma and pulmonary disease</td>
<td>Chronic obstructive pulmonary disease, asthma (adult)</td>
<td>Rose Boehm, CCRC, RRT, RCP 214-820-9772 <a href="mailto:RoseB@BaylorHealth.edu">RoseB@BaylorHealth.edu</a></td>
</tr>
<tr>
<td>Cancer</td>
<td>Breast, ovarian, endometrial, prostate, brain, lung, bladder, colorectal, pancreatic, and head and neck cancer; hematological malignancies, leukemia, multiple myeloma, non-Hodgkin’s lymphoma, melanoma vaccine; bone marrow transplant</td>
<td>Jana Holloway, RRT, CRC 214-820-9772 <a href="mailto:jana.holloway@baylorhealth.edu">jana.holloway@baylorhealth.edu</a> Grace Townsend 214-818-8472 <a href="mailto:cancer.trials@BaylorHealth.edu">cancer.trials@BaylorHealth.edu</a></td>
</tr>
<tr>
<td>Diabetes (Dallas)</td>
<td>Type 1 and type 2 diabetes, cardiovascular events</td>
<td>Kris Chionh 214-820-3416 <a href="mailto:kristen.chionh@baylorhealth.edu">kristen.chionh@baylorhealth.edu</a></td>
</tr>
<tr>
<td>Diabetes (Fort Worth)</td>
<td>Pancreatic islet cell transplantation for type I diabetics, who either have or have not had a kidney transplant</td>
<td>Kerri Purcell, RN 817-922-4640 <a href="mailto:kerrip@BaylorHealth.edu">kerrip@BaylorHealth.edu</a></td>
</tr>
<tr>
<td>Gastroenterology</td>
<td>Crohn’s disease</td>
<td>Dallas Clinical Trials Office 214-820-9626 <a href="mailto:kristen.chionh@baylorhealth.edu">kristen.chionh@baylorhealth.edu</a></td>
</tr>
<tr>
<td>Heart and vascular disease (Dallas)</td>
<td>Aortic aneurysms, coronary artery disease, hypertension, poor leg circulation, heart attack, heart disease, congestive heart failure, angina, carotid artery disease, familial hypercholesterolemia, surgical renal denervation for hypertension, diabetes in heart disease, cholesterol disorders, heart valves, thoracotomy pain, stem cells, critical limb ischemia, cardiac surgery associated with kidney injury, pulmonary hypertension</td>
<td>Meriele Boatman 214-820-2273 <a href="mailto:MerieleH@BaylorHealth.edu">MerieleH@BaylorHealth.edu</a></td>
</tr>
<tr>
<td>Heart and vascular disease (Fort Worth)</td>
<td>At risk for heart attack/stroke; previous heart attack/stroke/PAD; cholesterol disorders; atrial fibrillation; overweight/obese; other heart-related conditions</td>
<td>Deborah Devlin 817-922-2575 <a href="mailto:Deborah.Devlin@BaylorHealth.edu">Deborah.Devlin@BaylorHealth.edu</a></td>
</tr>
<tr>
<td>Heart and vascular disease (Legacy Heart)</td>
<td>Aneurysms; coronary artery disease; surgical renal denervation, or stent, for uncontrolled hypertension; poor leg circulation; heart attack; heart disease; heart valve repair and replacement; critical limb ischemia; repair of AAA, TAA, and dissections with endografts; thoracic surgery; leak repair; atrial fibrillation; carotid artery disease; congestive heart failure; left atrial appendage and stroke; gene profiling</td>
<td>Angela Germany 214-800-6469 <a href="mailto:heartresearch@baylorhealth.edu">heartresearch@baylorhealth.edu</a></td>
</tr>
<tr>
<td>Heart and vascular disease (Plano)</td>
<td>Homocysteine and kidney disease, dialysis fistulas, urine/protein disorders in cancer patients</td>
<td>Natalie Settele, PA-C 469-814-4712 <a href="mailto:natalie.settele@BaylorHealth.edu">natalie.settele@BaylorHealth.edu</a></td>
</tr>
<tr>
<td>Hepatology</td>
<td>Liver disease</td>
<td>Jonnie Edwards 214-820-6243 <a href="mailto:jonnie.edwards@baylorhealth.edu">jonnie.edwards@baylorhealth.edu</a></td>
</tr>
<tr>
<td>Infectious disease</td>
<td>HIV/AIDS</td>
<td>Bryan King, LVN 214-823-2533 <a href="mailto:bryan.king@ntidc.org">bryan.king@ntidc.org</a></td>
</tr>
<tr>
<td>Nephrology</td>
<td>Homocysteine and kidney disease, dialysis fistulas, urine/protein disorders in cancer patients</td>
<td>Jonnie Edwards 214-820-6243 <a href="mailto:jonnie.edwards@baylorhealth.edu">jonnie.edwards@baylorhealth.edu</a></td>
</tr>
<tr>
<td>Neurology</td>
<td>Stroke</td>
<td>Dion Graybeal, MD 214-820-4561 <a href="mailto:Dion.Graybeal@BaylorHealth.edu">Dion.Graybeal@BaylorHealth.edu</a></td>
</tr>
<tr>
<td>Neurosurgery</td>
<td>Multiple sclerosis</td>
<td>Annette Oka, MD 214-820-4655 <a href="mailto:annette.oka@BaylorHealth.edu">annette.oka@BaylorHealth.edu</a></td>
</tr>
<tr>
<td>Rheumatology (9900 N. Central Expressway)</td>
<td>Rheumatoid arthritis, psoriatic arthritis, lupus, gout, ankylosing spondylitis</td>
<td>John J. Cuth, MD 214-987-2523 <a href="mailto:jenniha@BaylorHealth.edu">jenniha@BaylorHealth.edu</a> Kathryn Dao, MD 214-987-1249 <a href="mailto:jenniha@BaylorHealth.edu">jenniha@BaylorHealth.edu</a></td>
</tr>
<tr>
<td>Transplantation</td>
<td>Bone marrow; blood stem cells</td>
<td>Grace Townsend 214-818-8472 <a href="mailto:Grace.Townsend@BaylorHealth.edu">Grace.Townsend@BaylorHealth.edu</a></td>
</tr>
<tr>
<td>Weight management</td>
<td>Obesity</td>
<td>Kris Chionh 214-820-3416 <a href="mailto:kristen.chionh@baylorhealth.edu">kristen.chionh@baylorhealth.edu</a></td>
</tr>
<tr>
<td>Women’s health (Fort Worth)</td>
<td>Endometriosis and endometrial ablation, interstitial cystitis/bladder pain syndrome</td>
<td>Theresa Cheyne, RN 817-922-2579 <a href="mailto:theresa.cheyne@BaylorHealth.edu">theresa.cheyne@BaylorHealth.edu</a></td>
</tr>
</tbody>
</table>

Baylor Research Institute is dedicated to providing the support and tools needed for successful clinical research. To learn more about Baylor Research Institute, please contact Kristine Hughes at 214-820-7556 or Kristine.Hughes@BaylorHealth.edu.
Dexmedetomidine infusion for analgesia up to 48 hours after lung surgery performed by lateral thoracotomy

Michael A. E. Ramsay, MD, Kate B. Newman, BSN, CCRC, Barbara Leeper, MN, CCRN, Baron L. Hamman, MD, Robert F. Hebeler Jr., MD, A. Carl Henry, MD, Harry Kourlis Jr., MD, Richard E. Wood, MD, Jack A. Stecher, MD, and H. A. Tillmann Hein, MD

Patients undergoing a lateral thoracotomy for pulmonary resection have moderate to severe pain postoperatively that is often treated with opioids. Opioid side effects such as respiratory depression can be devastating in patients with already compromised respiratory function. This prospective double-blinded clinical trial examined the analgesic effects and safety of a dexmedetomidine infusion for postthoracotomy patients when administered on a telemetry nursing floor, 24 to 48 hours after surgery, to determine if the drug’s known early opioid-sparing properties were maintained. Thirty-eight thoracotomy patients were administered dexmedetomidine intraoperatively and overnight postoperatively and then randomized to receive placebo or dexmedetomidine titrated from 0.1 to 0.5 μg·kg·h⁻¹ the day following surgery for up to 24 hours on a telemetry floor. Opioids via a patient-controlled analgesia pump were available for both groups, and vital signs including transcutaneous carbon dioxide, pulse oximetry, respiratory rate, and pain and sedation scores were monitored. The dexmedetomidine group used 41% less opioids but achieved pain scores equal to those of the placebo group. The mean heart rate and systolic blood pressure were lower in the dexmedetomidine group but sedation scores were better. The mean respiratory rate and oxygen saturation were similar in the two groups. Mild hypercarbia occurred in both groups, but periods of significant respiratory depression were noted only in the placebo group. Significant hypotension was noted in one patient in the dexmedetomidine group in conjunction with concomitant administration of a beta-blocker agent. The placebo group reported a higher number of opioid-related adverse events. In conclusion, the known opioid-sparing properties of dexmedetomidine in the immediate postoperative period are maintained over 48 hours.

The provision of excellent and safe postoperative pain management for patients who have undergone a major thoracotomy for lung or partial lung resection is challenging. Inadequate pain control may result in splinting of the chest, poor chest excursion, atelectasis, and respiratory failure. Pain management based on an opioid-based protocol runs the risk of adverse drug events related to narcotics. Several recent reports have demonstrated that respiratory depression and deep levels of sedation can occur when morphine patient-controlled analgesia (PCA) is prescribed (1–7). The patient with compromised pulmonary function may be at an increased risk for an adverse event.

Dexmedetomidine, an alpha 2-adrenergic receptor agonist, has been used to provide sedation in critical care patients and has been demonstrated to reduce opioid requirements, cause minimal respiratory depression, and improve outcomes (8–22). We hypothesized that the addition of a dexmedetomidine infusion to the postoperative pain management protocol would reduce the amount of morphine delivered by a PCA pump, reduce the opioid-induced adverse drug effects, and provide adequate analgesia for postthoracotomy patients. We also hypothesized that once the patient had been receiving dexmedetomidine for 24 hours, the infusion could be administered safely on a monitored telemetry unit as opposed to an intensive care unit (ICU) to maintain a good level of responsiveness and comfort, a Ramsay Sedation Score (RSS) of 2 to 4 (23), and hemodynamic stability. A prospective, double-blinded, controlled clinical pilot trial was designed to test these hypotheses.

METHODS

Institutional review board approval was obtained at Baylor University Medical Center at Dallas to enroll patients undergoing major open thoracotomy surgery between November 2006 and October 2007. All subjects were between 18 and 85 years of age and had an American Society of Anesthesiologists physical status of 3 or under. Subjects were excluded from enrollment if they had serious central nervous system pathology, a left ventricular ejection fraction of <30%, conduction abnormalities with the exception of first-degree atrioventricular block and rate-controlled atrial fibrillation, acute or chronic hepatitis, a requirement for renal supplementation, a known uncontrolled seizure disorder, a known or suspected physical or psychological dependence on an abused drug other than alcohol, or a psychiatric illness that would confound a normal response to sedative treatment or if they were pregnant or...
lactating. Prior to enrollment, subjects were screened for study eligibility. Informed consent was obtained prior to the initiation of any study procedures.

The medical history was reviewed and subjects underwent routine preoperative assessment and examination. The patients then underwent the standard anesthetic management for thoracic surgery at this institution. General anesthesia was induced with propofol, fentanyl, and sevoflurane and relaxation provided with vecuronium. Anesthesia continued utilizing one-lung ventilation with intraoperative fentanyl, sevoflurane, and an intraoperative infusion of dexmedetomidine at 0.2 to 0.5 μg·kg·h⁻¹ with no initial bolus. At the end of surgery, an injection of 5 cc ropivacaine 0.5% plain paravertebral block at levels T4, 5, 6, and 7 was provided. Patients emerged from the operating room extubated and awake with continuous local anesthetic wound infiltration delivered by an elastomeric infusion pump and stayed overnight in the ICU or postanesthesia care unit (PACU). Patients continued to receive dexmedetomidine intravenously titrated from 0.2 to 0.5 μg·kg·h⁻¹ during their ICU or PACU stay to provide adequate analgesia and comfort. Supplementary opioids were administered by a PCA pump.

Approximately 18 to 24 hours after surgery, patients were discharged from the ICU or PACU to the telemetry unit. Prior to discharge they were randomized to receive either normal saline or dexmedetomidine continuously infusing at a rate titrated between 0.1 and 0.5 μg·kg·h⁻¹ for up to 24 hours. A morphine PCA pump was available for both groups of patients. The intravenous dexmedetomidine infusion was stopped and the study drug was started in the ICU or PACU 30 minutes prior to transfer to the telemetry unit. Study infusion was titrated by 0.1 μg·kg·h⁻¹ increments in 30-minute intervals to maintain a pain score <5 on a 0 to 10 numeric pain scale, an RSS from 2 to 4, a systolic blood pressure >89 and <181 mm Hg, and a heart rate >49 and <111 beats per minute. The decision tree for titration is shown in Figure 1.

![Figure 1. Titration decision tree.](image-url)
Continuous electrocardiogram, pulse oximetry (SpO₂), and transcutaneous carbon dioxide (tcpCO₂) monitoring (TOSCA®, Radiometer, Copenhagen, Denmark) was in place while the patients were on the study drug. Blood pressure, heart rate, respiratory rate, SpO₂, tcpCO₂, pain score, and RSS were assessed and recorded every 2 hours and immediately preceding and 30 minutes following study drug titration. If the study drug remained off for >4 hours, the patient was withdrawn from the study. Concomitant medications (including any concomitant vasoactive medication required), total opioids administered, and adverse events were recorded. The study drug was discontinued at hour 24 of infusion, which was approximately 42 to 48 hours postsurgery or when the prepared study drug expired, whichever was sooner.

This was a double-blind, placebo-controlled randomized superiority pilot study. The primary outcome of interest was the amount of self-administered opioid medication during 24 hours after PACU or ICU discharge and 24 to 48 hours after surgery. The active drug study group was treated with low-dose dexmedetomidine and the placebo group with saline. Secondary outcomes were average pain scores, average sedation level as measured by RSS, instances of respiratory depression and hemodynamic instability, and the adverse effects of dexmedetomidine in this patient group.

To calculate an appropriate sample size and baseline opioid use, a preparatory chart review study was conducted. The medical records of 10 patients who would be typical of those presenting to this study were reviewed for their opioid use in the first 24 hours after discharge from the ICU or PACU. Fentanyl, hydromorphone, and other opioids were converted to intravenous morphine sulfate equivalents (mg) (Table 1). The data suggested that in a group of 10 thoracotomy patients, the amount of self-administered opioid in the first 24 hours post-PACU or ICU would range from 68 to 122.5 mg with a mean of 85 mg and a standard deviation of 20 mg. Of interest was to reduce the opioid use by half, i.e., to a mean value of 42.5 mg. Assuming that low-dose dexmedetomidine causes the average total opioid use during the first 24 hours post-PACU or ICU to be reduced to 42.5 mg, then 10 patients in each of the two treatment groups would be sufficient to demonstrate that difference as statistically significant at the type I and type II error rates of 0.05 and 0.10, respectively. Assuming that not more than 50% of enrolled patients would discontinue the drug prematurely, then a sufficient sample size for each group would need to include an additional 10 patients for a total enrollment of 40 subjects.

An interim unblinded analysis of the morphine sulfate use by study group was conducted after enrollment of 14 patients, 11 of which received study drug, to see if the results proved to be statistically significant, thus exposing a fewer number of subjects. This interim analysis determined that the premature discontinuation rate was higher than expected and the amount of variation in opioid use was larger than found in the preparatory chart review study. Taking into account the new estimate of variation and the unblinding of the 11 subjects randomized, a sufficient sample size for each group was estimated to be 19 patients.

A random permuted blocks design with a block size of eight was used to randomly allocate consented patients to the placebo or dexmedetomidine groups. An independent biostatistician provided the randomization scheme to the pharmacist to maintain the study as double blind.

A Student t test was used to evaluate the difference between the placebo and dexmedetomidine groups for the continuous variables such as the primary outcome of the amount of self-administered opioid medication during 24 hours post PACU or ICU and the secondary outcomes of infusion time, pain score, and vital signs. Chi-square analysis and Fisher exact test were utilized to evaluate the categorical variables such as gender and race. A P value of < 0.05 was considered significant.

RESULTS

A total of 51 patients signed the IRB-approved informed consent form, 32 women and 19 men with a mean age of 58 ± 13 years (± standard deviation). Thirteen of 51 were withdrawn from the study prior to randomization and start of the study drug: five were withdrawn because they did not have an overnight stay in the ICU or PACU, three withdrew consent, three had a serious adverse event and withdrawal was in their best interest, one was unable to be intubated and had surgery rescheduled, and one did not remain on dexmedetomidine overnight while in the ICU (Figure 2). Study drug was started in 38 subjects, with 19 subjects randomized into each study group. The demographic characteristics were similar between the two study groups when comparing age, gender, weight, and race (Table 2a).

The amount of time each group received study drug was equivalent, with the infusion amount and rate of early withdrawal similar between the two groups (Table 2b). Four subjects were withdrawn early, with the study drug permanently stopped during the course of the infusion, due to withdrawn consent (n = 1), hypotension (n = 1), pneumonia (n = 1), and volume depletion (n = 1). The one subject withdrew consent after 245 minutes of study drug infusion because of the intensity of the required monitoring. The hypotensive subject, randomized to the dexmedetomidine group, received a concurrent beta-blocker and experienced sustained mild hypotension. The protocol was subsequently changed to exclude administering routine beta-blockers while on study drug. After
750 minutes of study drug, the third patient, randomized to the dexmedetomidine group, was diagnosed with pneumonia and experienced tachycardia and hypotension. This patient was treated accordingly but was withdrawn from the study due to the sepsis syndrome that had developed. The fourth patient, randomized to the placebo group, was withdrawn from the study after the study drug had been off for 4 hours per protocol. This patient had the study drug stopped due to hypovolemia and hypotension. The blood pressure normalized with volume replacement that was initiated shortly after the 4-hour window.

The two groups were similar in the types of PCA pumps and supplemental opioids used (Table 2c). The results showed that the placebo group used 41% more total opioid in intravenous morphine equivalency than the dexmedetomidine group (P = 0.03) for the period of time on the study drug (Table 2b). When the opioid use was weighted for total time on study drug, the placebo group also used 35% more opioids than the dexmedetomidine group (P = 0.04). Figure 3 shows the variability of opioid use presented in morphine equivalency by study group.

The mean systolic blood pressure and heart rate by patient were significantly lower in the dexmedetomidine group than in the placebo group (P = 0.008 and P = 0.01, respectively). The mean RSS between the groups was significant, as the placebo group had no scores above an RSS of 2 while the dexmedetomidine group had an RSS that ranged from 2 to 4, indicating a comfortable relaxed patient. The two groups were statistically similar when looking at the mean diastolic blood pressure, respiratory rate, pulse oximetry, tcpCO2, and pain levels by patient (Table 2d).

No patients in either group had observed episodes of decreased respiratory rate. When looking at all recorded respiratory rates, the dexmedetomidine group had a larger percentage (49% vs 40%) of respiratory rates within the normal range of 10 to 18 breaths per minute (Figure 4). Placebo subjects had respiratory rates higher than the normal range more frequently than dexmedetomidine subjects (60% vs 51%), although this difference was not statistically significant (P = 0.08).

Comparing all subjects, the tcpCO2 was in the normal range of 38 to 42 mm Hg for 24% of the time while receiving study drug. The tcpCO2 was >42 mm Hg for 56% of the time for all subjects, and the mean tcpCO2 was similar across the two groups when looking at all times combined (P = 0.58). During hours 6 to 16, the mean tcpCO2 of the two groups was statistically different (42 ± 8 mm Hg vs 45 ± 9 mm Hg, P = 0.02) with a higher mean tcpCO2 for the placebo group (Figure 5). During this same timeframe, the mean pain scores for the dexmedetomidine and placebo groups were similar (3 ± 2.3 vs 3 ± 2.2, P = 0.59), but the mean RSS was significantly different (2 ± 0.3 vs 2 ± 0, P = 0.006).

A total of 43 adverse events were reported for all 51 patients (Table 3). Three of the adverse events—which included cardiac arrest, multiple organ dysfunction syndrome, and Stokes-Adams attacks—included subject withdrawal prior to randomization. The two episodes of bradycardia, defined as a heart rate <50 beats per minute, occurred in the same subject randomized to the placebo group and necessitated a short study drug interruption per protocol. The first episode was treated with 0.2 mg of glycopyrrolate intravenously and the second episode resolved without treatment.

In five separate instances, the study drug infusion was interrupted and then started again a short time later due to a systolic blood pressure of <90 mm Hg, one time in the placebo group and four times in the dexmedetomidine group. Study

![Figure 2. Participant flow.](image-url)

![Figure 3. Total opioid use presented in intravenous morphine equivalency of subjects randomized to placebo compared to intravenous dexmedetomidine.](image-url)
drug was resumed only with a systolic blood pressure of >89 mm Hg and after a minimum of 30 minutes and no longer than 4 hours had passed. Three of the five subjects, one in the placebo group and two in the dexmedetomidine group, did not require any interventions, and the study drug was resumed with no further complications. One dexmedetomidine subject experienced mild hypotension and had the study drug interrupted and restarted 30 minutes later with no interventions. Five and a half hours later, this same subject experienced hypotension and the study drug was interrupted. The study drug remained off and the subject was withdrawn from the study due to pneumonia and the sepsis syndrome that had developed. This same subject also was the one dexmedetomidine subject to experience tachycardia. A second dexmedetomidine subject had the study drug interrupted due to hypotension, which required treatment of a 250 mL normal saline bolus. The study drug was resumed 95 minutes later. This subject was withdrawn from the study 70 minutes after the second start of the study drug when it was discovered that a concurrent beta-blocker had been administered and the subject experienced a second episode of hypotension.

Adverse events associated with opioid administration such as constipation, nausea, and pruritus were reported in greater numbers in the placebo group (placebo = 12 vs dexmedetomidine = 4). The odds ratio of developing one of these side effects in the dexmedetomidine group was 0.3 compared with the placebo group, with a 95% confidence interval of (0.07, 1.23).

DISCUSSION

The standard procedure for managing postoperative pain for thoracotomy patients in this institution is to provide a paravertebral regional block with an injection of 5 cc ropivacaine 0.5% at levels T4 to T7 at the end of surgery. This is supplemented in the first 24 hours by an infusion of dexmedetomidine, and PCA morphine is also available. While opioids produce the added analgesia, they also cause respiratory depression that is particularly concerning in patients who

<table>
<thead>
<tr>
<th>Variable</th>
<th>Placebo group (n = 19)</th>
<th>Dexmedetomidine group (n = 19)</th>
<th>P value</th>
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<tbody>
<tr>
<td>a. Demographic characteristics</td>
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<tr>
<td>Age (years)</td>
<td>56 ± 13</td>
<td>61 ± 11</td>
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<td>Male</td>
<td>7 (37%)</td>
<td>8 (42%)</td>
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<td>Female</td>
<td>12 (63%)</td>
<td>11 (58%)</td>
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<tr>
<td>Weight (kg)</td>
<td>79.4 ± 20.4</td>
<td>79.2 ± 14.8</td>
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<td>Body mass index</td>
<td>25.8 ± 5.4</td>
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<tr>
<td>African American</td>
<td>0</td>
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<tr>
<td>Caucasian</td>
<td>19 (100%)</td>
<td>17 (89%)</td>
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<td>b. Drug administration</td>
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<tr>
<td>Total infusion time (minutes)</td>
<td>1281 ± 288</td>
<td>1214 ± 347</td>
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<td>Total study drug administered (mcg)</td>
<td>496† ± 239</td>
<td>497 ± 268</td>
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<td>Total study drug administered (mcg) adjusted to 24 hours</td>
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<td>576 ± 282</td>
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<tr>
<td>Early withdrawal</td>
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<td>0.60</td>
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<td>Consent withdrawn</td>
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<tr>
<td>Hypotension</td>
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<td>1 (5%)</td>
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<tr>
<td>Pneumonia</td>
<td>—</td>
<td>1 (5%)</td>
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<tr>
<td>Volume depletion</td>
<td>1 (5%)</td>
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<td></td>
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<tr>
<td>IV morphine equivalency administered (mg)</td>
<td>49 ± 35</td>
<td>29 ± 26</td>
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<td>IV morphine equivalency administered (mg) adjusted for total time on study drug</td>
<td>54 ± 37</td>
<td>35 ± 28</td>
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<td>c. Type of opioid use</td>
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<tr>
<td>PCA</td>
<td>Morphine sulfate: 18</td>
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<tr>
<td>Systolic blood pressure (mm Hg)</td>
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<td>114 ± 11.1</td>
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<td>Diastolic blood pressure (mm Hg)</td>
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<td>Heart rate (beats per minute)</td>
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<td>80 ± 12.3</td>
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<td>Respiratory rate (breaths per minute)</td>
<td>20 ± 2.8</td>
<td>19 ± 2.3</td>
<td>0.41</td>
</tr>
<tr>
<td>Pulse oximetry (%)</td>
<td>98 ± 1.6</td>
<td>97 ± 1.7</td>
<td>0.13</td>
</tr>
<tr>
<td>Transcutaneous carbon dioxide (mm Hg)</td>
<td>44 ± 5.3</td>
<td>43 ± 6.7</td>
<td>0.58</td>
</tr>
<tr>
<td>Pain score</td>
<td>3 ± 1.7</td>
<td>3 ± 2.3</td>
<td>0.52</td>
</tr>
<tr>
<td>Ramsay Sedation Scale</td>
<td>2 ± 0.1</td>
<td>2 ± 0.1</td>
<td>0.01*</td>
</tr>
</tbody>
</table>

*P < 0.05.
†Calculated based on infusion rates assuming concentration of dexmedetomidine group.
Data are presented as mean ± standard deviation or n (%).

Table 2. Results for subjects randomized to placebo compared to intravenous dexmedetomidine
have compromised respiratory function. Thoracotomy patients receiving opioids via a PCA pump postoperatively are at high risk for developing respiratory depression. A recent study by Overdyk et al found respiratory depression rates in postoperative patients with a PCA pump that were higher than previously reported (6).

Dexmedetomidine provides a unique type of sedation in which patients appear sleepy but are easily aroused. There is no significant respiratory depression even at high doses, and the drug possesses anxiolytic and moderate analgesic effects (24). This opioid-sparing anxiolytic and moderate analgesic effects (24). This opioid-sparing property together with anxiolysis and sedation could provide analgesia and comfort to postthoracotomy patients and potentially reduce the number and severity of opioid-induced side effects. By modulating the release of catecholamines, dexmedetomidine decreases sympathetic tone and attenuates the stress response to surgery and anesthesia. Some data suggest that dexmedetomidine is protective of major organs and can prevent acute brain dysfunction or delirium postoperatively (25–38). This may be of great significance in this often elderly and high-risk cardiac group of patients. However, although dexmedetomidine appears to be well tolerated, there have been reports of hypotension, bradycardia, and cardiac arrest associated with its administration (39–41).

As the drug modulates the release of catecholamines, vagus nerve activity is left unopposed and the patient requiring catecholamine support is in a critical situation. Therefore, signs of vagal overactivity should be treated with atropine or glycopyrrolate, and care should be given when considering the administration of dexmedetomidine to hypovolemic patients or patients in an early shock situation.

This pilot study addressed the need for adequate postoperative analgesia while at the same time decreasing the risk for respiratory depression and other untoward side effects by reducing opioid use. In this study, no patients were found to have a respiratory rate <10, although this was an intermittent measurement and brief transient changes in respiratory patterns are likely and could have been missed. The patients in this study had increased respiratory rates >50% of the time across both groups, with the percentage of the placebo group at >18 breaths per minute higher than

| Table 3. Adverse events in subjects randomized to dexmedetomidine or placebo |
|-----------------------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| Adverse event                          | Placebo†  | Dexmedetomidine† | Withdrawn from study prior to randomization† | Total |
| Nausea                                | 7          | 3               | —              | 10    |
| Headache                              | 1          | 1               | —              | 2     |
| Pruritus                               | 3          | —               | —              | 3     |
| Constipation                           | 2          | 1               | —              | 3     |
| Fever                                  | 2          | 1               | —              | 3     |
| Generalized weakness                   | 1          | 2               | —              | 3     |
| Systolic blood pressure <90 mm Hg*     | 1          | 4               | —              | 5     |
| Systolic blood pressure <90 mm Hg†     | 1          | 2               | —              | 3     |
| Heart rate <50 bpm                     | 2          | 0               | —              | 2     |
| Heart rate >110 bpm                    | 3          | 1               | —              | 4     |
| Potassium <3.6 mEq/L                   | —          | 1               | —              | 1     |
| Blood glucose >110 mg/dL               | —          | 1               | —              | 1     |
| Cardiac arrest/death                   | —          | —               | 1              | 1     |
| Multiple organ dysfunction syndrome    | —          | —               | 1              | 1     |
| Stokes-Adams syndrome                  | —          | —               | 1              | 1     |
| Total                                  | 23         | 17              | 3              | 43    |

*Required study drug interruption. 
†Subjects withdrawn from study due to concurrent beta-blocker, pneumonia, sepsis, and volume depletion.
that of the dexmedetomidine group (60% vs 51%). However, this probably represented hypoventilation with rapid shallow breathing, as CO₂ levels never declined below 40 mm Hg. Other measurements of respiratory status, such as mean pulse oximetry and mean transcutaneous carbon dioxide, were statistically similar when comparing the two groups. Yet the mean tcpCO₂ for both groups was above the normal 38 to 42 mm Hg, with the placebo group at a mean of 44 mm Hg and the dexmedetomidine group at a mean of 43 mm Hg. Because retaining CO₂ could have been part of an underlying medical condition in these patients, future studies should do a baseline tcpCO₂ reading prior to surgery in addition to immediately prior to the start of study drug, as was done in this trial.

While the mean tcpCO₂ by patient for all times was similar in the two groups, the readings between hours 6 and 16 were statistically significant between the two groups. The placebo group had a significantly higher tcpCO₂ during these times than the dexmedetomidine group with equal pain scores. At the same time, those in the dexmedetomidine group were more sedated, which may account for the raised pain scores. At the same time, those in the dexmedetomidine group used 41% less opioids than the placebo group with equal analgesia. This demonstrates the known opioid-sparing properties of dexmedetomidine previously reported, thus decreasing the risk for respiratory depression in these already compromised patients. A larger trial is recommended to determine the safety of administering low-dose dexmedetomidine outside an ICU setting.

Acknowledgments

Special thanks to the staff on 13 Roberts, PACU, and 2 Roberts ICU at Baylor University Medical Center at Dallas.


Role of alpha-2 agonists for postoperative pain relief

A cute postoperative pain is a complex and difficult problem to manage in the perioperative period. In addition to causing patient discomfort, it stimulates the sympathetic nervous system, increases myocardial oxygen demand, delays mobilization, impairs the immune system, and may potentially lead to chronic pain. Multimodal analgesia appears to be a very attractive method for postoperative pain management, as it decreases opioid requirements and thus associated complications such as nausea, emesis, and respiratory depression. The use of alpha-2 agonists for multimodal analgesia in the postoperative period has several potential benefits and is worth investigating.

Several studies have looked at the risks and benefits associated with the use of dexmedetomidine, an alpha-2 agonist, for postoperative pain. A recent meta-analysis demonstrated that postoperative dexmedetomidine administration reduced the average cumulative morphine equivalents by 6.0 mg at 12 hours and 14.5 mg at 24 hours, as well as pain scores by 1.4 at 1 hour and 0.6 at 24 hours. The same study showed that dexmedetomidine was more effective than acetaminophen but less effective than ketamine or nonsteroidal antiinflammatory medications. Alpha-2 agonists also seem to decrease postoperative nausea and vomiting, presumably by reducing the sympathetic tone; it has been suggested that postoperative nausea and vomiting may be triggered by high catecholamine concentrations. The main risk for using dexmedetomidine was the increased risk of postoperative bradycardia (1, 2). An animal study showed that a single intraperitoneal dose of dexmedetomidine had a long-term antinociceptive effect on acute heat pain (tail-flick test) and on carrageenan-induced inflammatory thermal hyperalgesia (paw withdrawal test) (3). In addition, the use of low-dose intravenous dexmedetomidine (1 mcg/kg) in elderly patients prior to spinal anesthesia with 1.2 mL of 0.5% bupivacaine prolonged the duration of spinal anesthesia and improved postoperative analgesia. Adverse effects, however, consisted of an increased incidence of sedation, desaturation, and bradycardia (4, 5).

In this issue, Ramsay et al set up a prospective double-blinded trial to investigate the analgesic effects of dexmedetomidine (0.1–0.5 mcg/kg/h) administered for 24 to 48 hours in patients who underwent lateral thoracotomies (6). Although the dexmedetomidine group used 41% less opioids, they had similar pain scores when compared to the placebo group. This study is unique as, to our knowledge, it is the first trial that continued the dexmedetomidine infusion for 48 hours postoperatively for pain relief. The two main limitations of this study are the small population size and the need for intensive care monitoring in the postoperative period while the patients were on a dexmedetomidine infusion. The requirement for intensive postoperative monitoring might not be available in other institutions.

Thoracic epidural analgesia is still considered the gold standard for pain relief after thoracotomies; however, its effectiveness and safety profile have been challenged. The failure rate of thoracic epidurals may be up to 50%. In addition, with the increased use of low-molecular-weight heparin for deep venous thrombosis prophylaxis, there has been an increase in the incidence of epidural hematomas, primarily in elderly patients (7). A survey of Australian anesthesiologists showed that 82% of them had inserted fewer epidural catheters due to the fear of litigation and a lack of evidence for beneficial effects (8). A good alternative to thoracic epidural analgesia for thoracotomies is paravertebral blocks due to a lower incidence of complications (9). The use of the novel alpha-2 agonist fadolmidine for paravertebral blocks in addition to local anesthetics might prove to be an attractive use of alpha-2 agonists for postoperative analgesia (10). The study by Ramsey in this issue as well as other publications highlight the need for a large well-powered study to better evaluate the value of alpha-2 agonists in postoperative pain management.

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Sedation levels during propofol administration for outpatient colonoscopies

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The levels of sedation required for patients to comfortably undergo colonoscopy with propofol were examined. One hundred patients undergoing colonoscopy with propofol were enrolled. In addition to standard-of-care monitoring, sedation level was monitored with the Patient State Index (PSI) obtained from a brain function monitor, transcutaneous carbon dioxide (tcpCO₂) was monitored with the TCM TOSCA monitor, and end-tidal carbon dioxide was monitored via nasal cannula. The Ramsay Sedation Score (RSS) was also assessed and recorded. After baseline data were obtained from the first 40 consecutive patients enrolled in the study, the remaining 60 patients were randomized into two groups. In one group the PSI value was blinded from the anesthesiologist and in the second group the PSI was visible and the impact of this information on the management of the sedation was analyzed. Overall 96% of patients reached levels of deep sedation and 89% reached levels of general anesthesia. When comparing the blinded to PSI versus unblinded groups, the blinded group had a significantly lower PSI and higher RSS and tcpCO₂, indicating the blinded group was maintained at a deeper sedation level with more respiratory compromise than the unblinded group. Patients undergoing colonoscopy under propofol sedation delivered by a bolus technique are frequently taken to levels of general anesthesia and are at risk for respiratory depression, airway obstruction, and hemodynamic compromise.

Propofol sedation for outpatient endoscopy has become a popular technique in place of midazolam and opioids, although the combination technique still has its proponents (1). Propofol alone has been associated with improved patient satisfaction and faster recovery with less nausea and vomiting (2) and has been recommended as a safe technique for patients when administered by nurses under the supervision of a physician-endoscopist (3–6). It has a very short onset of action and has a plasma half-life of 2 to 4 minutes, leading to a rapid recovery. However, a number of potential adverse effects are associated with propofol. It has no analgesic effects; therefore, when used for moderate sedation, propofol frequently has to be administered in amounts to provide deep levels of sedation to allow a painful procedure to be performed. Propofol-induced respiratory and cardiac depression is dose dependent and may put patients at risk, particularly if they have significant comorbidities, so that supportive interventions may be necessary. However, the short duration of action will allow many patients to recover before any lasting untoward effects occur. Patients are typically administered supplemental oxygen during the endoscopy procedure. Pulse oximetry (SpO₂) is frequently used as an indicator of the patient’s ventilatory status; however, supplemental oxygen limits the usefulness of SpO₂ in this regard (7–9). We examined the levels of sedation required for patients to comfortably undergo routine colonoscopy using bolus doses of propofol as a sole agent in the manner described by Rex, Overley, and Walker (3). Additional monitoring systems were also utilized to determine the depth of sedation and degree of respiratory depression.

METHODS

Institutional review board (IRB) approval was obtained at Baylor University Medical Center at Dallas to enroll patients undergoing outpatient colonoscopies during a 9-month period. One hundred patients scheduled for an outpatient colonoscopy were enrolled in this prospective trial. Patients were recruited from the practice of two gastroenterologists and were eligible if they were scheduled for an outpatient colonoscopy with a specific anesthesiologist, who planned to administer propofol only for sedation. The patients were over 18 years of age and had an American Society of Anesthesiologists (ASA) risk class of 1, 2, or 3. Informed consent was obtained prior to the start of the procedure using an IRB-approved consent form.

Propofol was administered with an initial bolus of 30 to 50 mg given over 5 to 10 seconds through a rapid running intravenous catheter. Approximately 50 to 70 seconds after the first dose, a second dose was administered, consisting of 10 to 30 mg depending on how the patient reacted to the initial dose. This was similar to the nurse-administered propofol sedation (NAPS) technique described by Rex et al (3), who noted that the dose of propofol required to initiate the colonoscopy may vary from 30 to >200 mg. If the patient seemed to experience discomfort during the procedure, a 10- to 20-mg bolus was delivered. The NAPS technique excluded ASA 3 patients, those with sleep apnea or...
other signs of a difficult airway, and those at an increased risk of reflux. No other sedatives or pain medications were administered. All patients received supplemental oxygen via nasal cannulae. The safety record of the NAPS technique has been reported to be good, with less than 1 in 500 cases having a need for brief periods of mask ventilation. In that review of more than 17,000 patients, no other adverse events were recorded (5).

In addition to standard-of-care monitoring of vital signs, sedation levels were monitored with the Ramsay Sedation Scale (RSS) (Table 1), and brain function was monitored using the Patient State Index (PSI) obtained from a brain function monitor (Hospira, Inc., Lake Forest, IL). Transcutaneous carbon dioxide (tcpCO₂) was monitored with the TCM TOSCA® monitor (Radiometer Copenhagen, Basel, Switzerland), and end-tidal carbon dioxide (EtCO₂) was monitored via nasal cannulae. Blood pressure was recorded every 5 minutes, and heart rate, respiratory rate, PSI, RSS, and oxygenation by SpO₂, end-tidal carbon dioxide (EtCO₂) was monitored via nasal cannulae. Blood pressure was recorded every 5 minutes, and heart rate, respiratory rate, PSI, RSS, and oxygenation by SpO₂, EtCO₂, and tcpCO₂ were displayed continually and recorded at the top of every minute during the course of the procedure.

The anesthesiologist was privy to the PSI data for the first 40 subjects enrolled so that a baseline level of sedation could be ascertained as complemented by the PSI. The next 60 patients were numbered sequentially as they were enrolled and randomized to a blinded or unblinded group. All even-numbered patients were randomized to a blinded group where the anesthesiologist was blinded to the PSI data. The anesthesiologist was able to view the PSI data for odd-numbered subjects. The goal of this second part of the study was to see if information from a brain function monitor would affect the management of the sedation technique.

Each patient was monitored according to the standards of the ASA by the anesthesiologist who performed all necessary airway interventions. Airway interventions were designated as any action taken to improve or restore ventilation and included chin lifts, jaw thrust, the addition of an oxygen mask, insertion of nasal or oral airways, and ventilatory assist maneuvers. Airway interventions were recorded along with the total bolus doses of propofol. Airway interventions were always made at the judgment of the anesthesiologist.

For the purposes of this study, a PSI of 70 to 51 was considered deep sedation and a PSI of 50 or below was considered general anesthesia. General anesthesia as defined by the ASA occurs when a patient is not arousable, airway interventions may be required, spontaneous breathing is often inadequate, and cardiovascular function may be impaired.

A Fisher’s exact analysis was utilized to evaluate the categorical variables of ASA classification and gender. A nonparametric Wilcoxon two-sample test was used to evaluate the difference between the blinded and unblinded groups for vital signs, patient age, length of procedure, and propofol administration. Stepwise logistic regression was applied to see if a combination of measurements or drop or rise of a measurement in the minutes prior to the intervention was predictive of the intervention. A P value < 0.05 was considered significant.

RESULTS

A total of 100 patients were enrolled in this study. One subject was withdrawn from the study due to differing opinions on ASA physical status, and data from one subject were incomplete due to a data collection error and thus were not included. A total of 46 women and 52 men with a mean age of 59.9 ± 11.7 years were evaluated.

Of the 98 subjects undergoing colonoscopy using this NAPS technique, 94 patients (96%) were under deep sedation accounting for 68% of the total procedure time, and 87 patients (89%) were under general anesthesia accounting for 47% of total procedure time as graded by the ASA classification of sedation, the RSS, and the PSI data. During the endoscopy, 65 patients (66%) required at least one airway intervention.

The demographic characteristics and procedure data of the two study groups was similar with the exception of procedure length (Table 2a). The unblinded-to-PSI group had a significantly longer procedure time (P = 0.002) than the blinded group, with the mean total amount of propofol used similar between the groups. The percentage of subjects requiring an airway intervention was higher in the unblinded group, which also had more aggressive interventions (Table 2b). No interventions beyond a jaw thrust were performed in the blinded group. Subjects in the blinded group spent 18.3% of total procedure time with an airway intervention, and subjects in the unblinded group spent 18.2% of total procedure time with an airway intervention.

The vital signs of the blinded and unblinded groups are shown in Table 2c. The blinded group was kept at a deeper sedation level than the unblinded group, with a lower mean PSI (P < 0.001) and a higher RSS (P < 0.001). There were no significant differences between the two groups for three of the four indicators of respiratory status, although tcpCO₂ demonstrated that the blinded-to-PSI subjects had a significantly higher tcpCO₂ (48 vs 43, P < 0.001), indicating respiratory depression not detected in the other three monitoring methods.

The sedation levels and respiratory data of the blinded and unblinded groups were compared at the time of an airway intervention (Table 2d). When the anesthesiologists were blinded to the PSI, the interventions occurred when the patient was more sedated with a higher RSS (P = 0.02). During the interventions, the blinded group had a significantly higher tcpCO₂ than the unblinded group (P = 0.003). Figure 1a shows that 68% of airway interventions occurred at a PSI of 70 or below, and 44% occurred at a PSI of 50 or below; Figure 1b shows the ranges of EtCO₂ at

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**Table 1. Ramsay Sedation Scale**

<table>
<thead>
<tr>
<th>Score</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Anxious and agitated or restless or both</td>
</tr>
<tr>
<td>2</td>
<td>Cooperative, oriented, and tranquil</td>
</tr>
<tr>
<td>3</td>
<td>Responds to commands only</td>
</tr>
<tr>
<td>4</td>
<td>Brisk response to light glabellar (forehead) tap or auditory stimulus</td>
</tr>
<tr>
<td>5</td>
<td>Sluggish response to light glabellar (forehead) tap or loud auditory stimulus</td>
</tr>
<tr>
<td>6</td>
<td>No response</td>
</tr>
</tbody>
</table>

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the time the airway intervention occurred. Sixty-three percent of the interventions occurred when the respiratory rate was >15 breaths per minute, 63% when the \( \text{SpO}_2 \) was >95%, 58% when the tcpCO\(_2\) was >45, and 38% when the EtCO\(_2\) was <30.

The subjects with an airway intervention were significantly more sedated, with a lower \( \text{SpO}_2 \), than those with no airway intervention (Table 3). The mean PSI was also significantly lower during the intervention (\( P < 0.001 \)), and the RSS was higher (\( P < 0.001 \)). As the mean \( \text{SpO}_2 \) was above 95%, the differences in \( \text{SpO}_2 \) between the two groups did not have clinical significance. The same is true with the RSS; the differences may not be clinically detectable, as the subjects were all in the deep sedation/general anesthesia range.

Three adverse events occurred in three different patients, two in the blinded group and one in the unblinded group (Table 2e). One subject experienced bradycardia with a heart rate of 39 beats per minutes. The subject was then treated with 0.2 mg of glycopyrrolate, and no further interventions were needed. Hypertension (a blood pressure of 173/78 mm Hg) was noted in one patient who was treated with 3 mg of metoprolol with no further interventions required. One subject required oxygen via a nonrebreather oxygen mask 5 minutes into the colonoscopy procedure and then required a nasal airway. The nasal airway was removed 4 minutes after insertion at the request of the subject with no further interventions required.

**DISCUSSION**

Greater than 88% of patients undergoing propofol sedation using a bolus technique, as described by Rex et al (6) for NAPS, for routine colonoscopy procedures are taken to levels of deep sedation or general anesthesia for some part of the procedure and are subsequently at risk for respiratory depression, airway obstruction, and hemodynamic compromise. Therefore, the health care provider administering the propofol in this manner must be trained in recognizing and managing respiratory compromise and rescuing patients with obstructed airways.

When the anesthesiologist was privy to the PSI value, the intervention occurred before the subject reached a level of general anesthesia. Additionally, the subjects were kept at a lighter sedation level with monitors of respiratory status such as RR, \( \text{SpO}_2 \), tcpCO\(_2\) and EtCO\(_2\) being closer to normal ranges than when the PSI was not available, even at the time when an airway

<table>
<thead>
<tr>
<th>Table 2. Data in the groups where the anesthesiologist was blinded to the PSI or unblinded to the PSI</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Blinded group</strong></td>
</tr>
<tr>
<td>(n = 29)</td>
</tr>
<tr>
<td><strong>a. Demographic and procedure data</strong></td>
</tr>
<tr>
<td>Age (years)</td>
</tr>
<tr>
<td>Male</td>
</tr>
<tr>
<td>Female</td>
</tr>
<tr>
<td>Length of procedure (minutes)</td>
</tr>
<tr>
<td>ASA classification</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td>Total propofol use (mg)</td>
</tr>
<tr>
<td><strong>b. Airway intervention</strong></td>
</tr>
<tr>
<td>Chin lift</td>
</tr>
<tr>
<td>Jaw thrust</td>
</tr>
<tr>
<td>Nasal airway</td>
</tr>
<tr>
<td>Oral airway</td>
</tr>
<tr>
<td>Oxygen mask</td>
</tr>
<tr>
<td><strong>c. Vital signs</strong></td>
</tr>
<tr>
<td>PSI</td>
</tr>
<tr>
<td>RSS</td>
</tr>
<tr>
<td>( \text{SpO}_2 ) (%)</td>
</tr>
<tr>
<td>RR (breaths/min)</td>
</tr>
<tr>
<td>tcpCO(_2) (mm Hg)</td>
</tr>
<tr>
<td>EtCO(_2) (mm Hg)</td>
</tr>
<tr>
<td><strong>d. Vital signs at the time of airway intervention</strong></td>
</tr>
<tr>
<td>PSI</td>
</tr>
<tr>
<td>RSS</td>
</tr>
<tr>
<td>( \text{SpO}_2 ) (%)</td>
</tr>
<tr>
<td>RR (breaths/min)</td>
</tr>
<tr>
<td>tcpCO(_2) (mm Hg)</td>
</tr>
<tr>
<td>EtCO(_2) (mm Hg)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 3. Patient statistics in those with airway intervention or no airway intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Test</strong></td>
</tr>
<tr>
<td><strong>PSI</strong></td>
</tr>
<tr>
<td><strong>RSS</strong></td>
</tr>
<tr>
<td>( \text{SpO}_2 ) (%)</td>
</tr>
<tr>
<td>RO (breaths/min)</td>
</tr>
<tr>
<td>tcpCO(_2) (mm Hg)</td>
</tr>
<tr>
<td>EtCO(_2) (mm Hg)</td>
</tr>
</tbody>
</table>

Data are presented as mean ± standard deviation. PSI indicates Patient State Index; RSS, Ramsay Sedation Scale; \( \text{SpO}_2 \), oxygen saturation; RR, respiratory rate; tcpCO\(_2\), transcutaneous carbon dioxide; EtCO\(_2\), end-tidal carbon dioxide.

*Three subjects had more than one intervention concurrently, i.e., a nasal airway and oxygen mask at the same time.

Data are presented as mean ± standard deviation or n (%). ASA indicates American Society of Anesthesiologists; PSI, Patient State Index; RSS, Ramsay Sedation Scale; \( \text{SpO}_2 \), oxygen saturation; RR, respiratory rate; tcpCO\(_2\), transcutaneous carbon dioxide; EtCO\(_2\), end-tidal carbon dioxide.
intervention occurred. If interventions were deemed to be appropriate for the blinded subjects, the intervention occurred when the mean PSI was considered to be general anesthesia and with significantly higher tcpCO2, indicating a prolonged hyperventilation. In addition, a larger number of airway interventions, and more aggressive interventions, were performed in the group where the anesthesiologist had access to PSI data.

The use of supplemental oxygen during the procedure keeps the SpO2 in the high 90s and minimizes its usefulness as a sensitive monitor of respiratory depression (7–9). Downs and his team have clearly demonstrated how the administration of supplemental oxygen can allow arterial carbon dioxide levels to reach dangerously high levels before oxygen saturation declines significantly (8). Data from this study are consistent with Downs’ work, as airway interventions were generally made by anesthesiologists while the SpO2 was still within acceptable levels but the tcpCO2 was elevated. The mean tcpCO2 of 48 mm Hg in the blinded group versus 43 mm Hg in the unblinded group indicates the blinded group experienced significant respiratory compromise, as the physiological rate of the increase of the partial pressure of arterial carbon dioxide is 3 to 6 mm Hg per minute during apnea (10).

The study was designed knowing that supplemental oxygen limits the usefulness of SpO2 and, therefore, EtCO2 and tcpCO2 were monitored to determine if the CO2 level change was predictive of respiratory distress. Stepwise logistic regression was performed on all measures of respiratory status and sedation levels to see if a combination of measurements in the minutes prior to an airway intervention was predictive of the intervention. None of the statistically significant measurements were related strongly enough to be predictive of the need for an intervention.

All colonoscopies were performed by one of two gastroenterologists. Ideally, future studies should be done utilizing a single gastroenterologist to ensure consistency. In addition, baseline vital signs including baseline CO2 should be recorded immediately prior to the start of the procedure in order to determine changes from baseline rather than protocol-driven parameters.

In conclusion, although none of the monitors were predictive of an airway intervention, the data showed that subjects undergoing colonoscopy were frequently taken to levels of general anesthesia and more patients required an airway intervention at deeper levels of sedation. When anesthesiologists were privy to PSI, the patients were maintained at a lighter sedation level, received more interventions to improve or restore ventilation, and had other measures of sedation and respiratory status that are closer to the normal ranges than when anesthesiologists were not privy to PSI data.

Acknowledgments
Funding was provided as Grant-In-Aid by Hospira, Inc., Lake Forest, IL. SEDLine® monitors were provided by Hospira, Inc., Lake Forest, IL, and are now marketed by Masimo Corp. TCM TOSCA® monitors were provided by Radiometer, Copenhagen, Denmark. Michael A. E. Ramsay, MD, received research grants and honoraria from Hospira, Inc. and Masimo Corp.

The incidence of hypertriglyceridemia in acromegaly is three times higher than in the normal population, and it is the most common dyslipidemia in acromegaly. We present a case of hypertriglyceridemic pancreatitis confirmed by imaging, with normal pancreatic enzymes. Hypertriglyceridemia in this patient was likely secondary to acromegaly. The hypertriglyceridemic pancreatitis appears to be secondary to somatotrophic pituitary adenoma.

Acromegaly occurs as a result of excessive production of growth hormone (GH), with more than 98% of cases being caused by a pituitary adenoma (1). Moderate hypertriglyceridemia is a complication of acromegaly. Among the causes of acute pancreatitis, severe hypertriglyceridemia accounts for about 10% of the cases (2). The serum lipase and amylase levels are usually elevated. Normal serum lipase in the setting of acute pancreatitis is an extremely rare occurrence (3). We present a case of acute hypertriglyceridemic pancreatitis with normal serum amylase and lipase levels associated with acromegaly.

CASE REPORT

A 30-year-old Hispanic man with recently diagnosed diabetes mellitus presented to the emergency department with 4 days of intermittent colicky left upper quadrant pain, 8/10 in intensity, nonradiating, and associated with anorexia. He denied nausea, vomiting, diarrhea, and fever. His blood pressure was 130/70 mm Hg; temperature, 99.3°F; heart rate, 99 beats per minute; and respirations, 16 per minute. He was 70” tall and weighed 76 kg, for a body mass index of 24.2 kg/m². His voice was deep, and he demonstrated prognathism, teeth separation, thickened skin, and broad hands and feet. His left upper quadrant was tender without rebound, there was no visceromegaly, and bowel sounds were normal. Laboratory results are shown in Table 1. Computed tomography (CT) of the abdomen showed a thickened pancreas with subtle haziness and stranding in the surrounding peripancreatic fat and a small amount of fluid in the anterior pararenal space (Figure 1a). After treatment with intravenous fluid therapy, subcutaneous insulin, analgesia, and fenofibrate, his symptoms gradually improved.

Table 1: Admission serum laboratory values

<table>
<thead>
<tr>
<th>Variable</th>
<th>Value</th>
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From the Department of Internal Medicine, Texas Tech University Health Sciences Center, Lubbock, Texas.

Corresponding author: David Sotello, MD, 3601 4th Street, MS 9410, Lubbock, TX 79430 (e-mail: david.sotello@ttuhsc.edu).
The patient denied headaches, visual disturbances, joint pain, recent facial morphologic changes, changes in ring, shoe, or hat size, or sexual dysfunction. He had normal visual acuity, fields, and color vision. Head magnetic resonance imaging (MRI) (Figure 1b) showed a mass in the pituitary gland extending to the right side of the sphenoid sinus (18.5 × 14.7 × 17.2 mm), consistent with a pituitary macroadenoma. The patient underwent transsphenoidal tumor resection; the pathologic diagnosis was pituitary adenoma, granulated somatotrophic type (Figure 2).

DISCUSSION

It is estimated that about 40% of patients with acromegaly develop diabetes mellitus (1). Pancreatic cell dysfunction and insulin resistance from the antiinsulinergic effect of excess GH and insulin-like GF have been proposed as part of the pathogenesis (4). GH-dependent inhibition of lipoprotein lipase activity also results in hypertriglyceridemia, the lipid abnormality most commonly described in acromegaly (1).

The American College of Gastroenterology states that the diagnosis of acute pancreatitis requires the presence of two of the following three criteria: 1) characteristic abdominal pain; 2) serum amylase and/or lipase more than three times the upper limit of normal; and 3) CT scan findings compatible with acute pancreatitis (3). Pancreatitis secondary to hypertriglyceridemia accounts for approximately 10% of the cases (2), with an increased risk for acute pancreatitis associated with severe hypertriglyceridemia (≥500 mg/dL) (5), as in our patient.
Although the negative predictive value of lipase is very high (≥95%) for the diagnosis of acute pancreatitis (6), cases presenting with normal serum amylase and lipase have been reported, especially in association with hypertriglyceridemia, extensive pancreatic necrosis (acute fulminant or acute chronic pancreatitis), gallstone pancreatitis, and alcohol-induced pancreatitis (5, 7). Plasma triglyceride levels >500 mg/dL interfere with the in vitro determination of the actual amylase level by preventing the calorimetric reading of the assay endpoint (5); however, the reasons for a normal serum lipase level in patients with hypertriglyceridemic pancreatitis are uncertain (7).

After a PubMed and Scopus search, we recovered only three cases of hypertriglyceridemic pancreatitis secondary to somatotrophic pituitary adenoma with elevated lipase and amylase (8). This case could represent the first case reported of hypertriglyceridemic pancreatitis with normal lipase secondary to a somatotrophic pituitary adenoma.

Steroid-resistant nephrotic syndrome secondary to primary focal segmental glomerulosclerosis and smoldering multiple myeloma

Rupin Shah, MBBS, Nishi Shah, MBBS, Arun Shah, MD, and Ankit N. Mehta, MD

We present a patient with steroid-resistant nephrotic syndrome due to focal segmental glomerulosclerosis along with smoldering multiple myeloma. While investigating the cause of proteinuria, a monoclonal gammopathy with a negative kidney biopsy for myeloma-related pathology was discovered.

CASE REPORT

A 62-year-old man with systemic hypertension for at least 1 year on amlodipine 5 mg daily presented with frothy urine for 3 months. He weighed 76 kg, with no recent changes. His blood pressure was 140/80 mm Hg. Urinalysis disclosed a 4+ proteinuria with no erythrocytes or leucocytes. He had a serum creatinine of 0.8 mg/dL, serum albumin of 3.2 g/dL, and total cholesterol of 283 mg/dL. His 24-hour urine protein was 4.3 g. His fasting blood sugar, postprandial blood sugar, anti-streptolysin titer, C3/C4 complement, and β-2 microglobulin levels were all within normal limits. Tests for hepatitis B surface antigen, antineutrophil cytoplasmic antibody, antinuclear antibodies, human immunodeficiency virus 1 and 2, and hepatitis C virus antibodies were all negative. Renal ultrasonography revealed normal-sized kidneys with no masses or stones and normal renal echogenicity. His serum protein electrophoresis showed a monoclonal band in the gamma region measuring 1.5 g/dL. Serum immunofixation studies showed immunoglobulin G kappa monoclonal protein. The patient’s serum free light chain ratio (kappa/lambda ratio) was 6.1.

Light microscopy of the kidney biopsy revealed segmental areas of mesangial collapse in most glomeruli (Figure 1) with some global glomerulosclerosis (Figure 2). No light chain deposition, clusters of plasma cells, or amyloid deposits were observed. Tubules had evidence of acute tubular necrosis but no tubular casts. Immunofluorescence microscopy did not reveal any significant deposits of immunoglobulin G, immunoglobulin M, immunoglobulin A, complement 3, or complement C1q fibrin, kappa, or lambda. Electron microscopy revealed effacement of foot processes, and no fibrils or deposits were noted (Figure 1). A diagnosis of focal segmental glomerulosclerosis (FSGS) not otherwise specified was made. Bone marrow aspirate showed 8% to 10% plasma cells, and bone marrow biopsy showed 15% plasma cells with kappa light chain restriction. The patient had
a calcium level of 9.1 mg/dL and a hemoglobin of 14.9 g/dL. His skeletal survey did not show any lytic lesions. A magnetic resonance imaging skelto gram was also negative.

The patient was started on oral prednisone 1 mg/kg in addition to his angiotensin receptor blocker and angiotensin-converting enzyme inhibitor. Three months later, his proteinuria had not decreased, whereas there was a reduction in his free light chains and a monoclonal protein spike. Since the patient was still having severe proteinuria, cyclophosphamide (1 g intravenously every month) was started, and the prednisone was tapered to 5 mg/day. After 6 months of treatment with cyclophosphamide and low-dose prednisone, the patient's proteinuria and serum monoclonal protein were lower. Cyclophosphamide was stopped and the low-dose prednisone continued. His serum free kappa light chain as well as his 24-hour proteinuria increased within a matter of weeks (Table 1). At that time dexamethasone (20 mg by mouth weekly) and cyclophosphamide (1 g every 8 weeks) were begun, and both the free light chains and proteinuria responded to this treatment.

**DISCUSSION**

In most patients with plasma cell disorder, the renal lesion is paraprotein related (1). The most common paraprotein-associated lesions are myeloma cast nephropathy, monoclonal immunoglobulin deposition disease, and amyloidosis. In such cases the treatment for the renal lesion is to treat the underlying cause, i.e., myeloma. The most common non–paraprotein-associated lesions seen on renal biopsy are acute tubular necrosis, hypertensive arteriosclerosis, and diabetic nephropathy (1). These have been attributed to a variety of causes: hypercalcemia, drug toxicity (e.g., nonsteroidal anti-inflammatory drugs), contrast exposure, and other coexisting illnesses such as diabetes mellitus and hypertension. The well-established connection of FSGS with myeloma is pamidronate; it is used to treat hypercalcemia due to bone lesions, including lytic lesions as seen in myeloma. Exposure to pamidronate has been described to cause a characteristic collapsing variety of FSGS (2). The absence of any myeloma-related renal pathology, the presence of glomerulosclerosis, and a negative etiological workup for proteinuria pointed towards an idiopathic FSGS in our patient. However, some may still argue that the two processes are in fact related (3).

It has been reported that patients with smoldering multiple myeloma (SMM) will progress to symptomatic myeloma or amyloidosis at an approximate rate of 10% per year for the first 5 years, 3% per year for the next 5 years, and 1% to 2% per year for the following 10 years (4). Risk factors for progression include a high serum monoclonal protein level, a high proportion of plasma cells in the bone marrow, and a high serum free light chain ratio (5). Currently, the consensus is to treat SMM only if there is evidence of progression of the monoclonal gammopathy (6).

Steroids were an appealing treatment choice in our patient since they are the first line of therapy for idiopathic nephrotic syndrome as well as effective in suppressing myeloma. The plan was to treat the patient's proteinuria/FSGS with steroids and monitor his SMM. However, after 3 months of steroids, the patient showed deterioration in his proteinuria but with evidence of improvement in his SMM parameters, i.e., a lower level of serum monoclonal protein and free light chains. This reinforced our belief that the patient's nephrotic syndrome and monoclonal gammopathy were not related in a causative fashion. When the patient's proteinuria failed to respond to 3 months of steroids, cyclophosphamide was picked as the immunosuppression agent. Even though cyclosporine is, arguably, the preferred agent for steroid-resistant FSGS, we chose cyclophosphamide due to its long track record in myeloma treatment (7, 8). After 6 months of monthly cyclophosphamide, the patient had evidence of relapse of his primary FSGS on stopping the agent. Again, cyclophosphamide was used on a bimonthly basis as a maintenance regimen in preference to other immunosuppressants like cyclosporine or mycophenolate mofetil. Use of cyclophosphamide clearly improved the patient's monoclonal gammopathy.

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January 2014  
Steroid-resistant nephrotic syndrome secondary to primary FSGS and SMM  
21
Systemic mastocytosis (SM) is a condition associated with a clonal neoplastic proliferation of mast cells. Approximately 40% of patients with SM present with an associated clonal hematological non–mast cell lineage disorder. Patients presenting with SM–acute myeloid leukemia (AML) have the worst prognosis. We present a case of a 62-year-old woman who was diagnosed with SM-AML. After initial treatment with a standard regimen of cytosine arabinoside (Ara-C)/idarubicin, her bone marrow showed residual blasts. She was subsequently treated with a second induction regimen of clofarabine and high-dose Ara-C, which resulted in remission of AML, although a residual mast cell infiltrate persisted in her bone marrow. After consolidation therapy with clofarabine/Ara-C, the patient received a stem cell allograft. A follow-up bone marrow showed no residual blasts but persistent mast cells occupying about 5% of the marrow volume.

Systemic mastocytosis with associated acute myelogenous leukemia
Leah Zhrebker, MD, Barry Cooper, MD, and John R. Krause, MD

M astocytosis is a clonal neoplastic proliferation of mast cells that accumulate in one or more organ systems. According to the latest classification from the World Health Organization, there are seven subtypes of mastocytosis (1). The second most common type of mastocytosis is known as systemic mastocytosis with an associated clonal hematologic non–mast cell lineage disorder (SM-AHNMD). These non–mast cell lineage disorders may include myelodysplastic syndrome (MDS), myeloproliferative neoplasm (MPN), acute myeloid leukemia (AML), chronic myelogenous leukemia, MDS/MPN, plasma cell myeloma, non-Hodgkin lymphoma, and unclassifiable myelogenous malignancy (2). An associated AML has the worst prognosis (3). We present a case of mastocytosis associated with an AML and discuss the pathology and treatment.

PATIENT DESCRIPTION
A 62-year-old white woman was noted to have a pancytopenia 3 years prior to admission. Her hematocrit was 30%, white blood cell count 3300 K/uL with 44% neutrophils, and platelet count 109,000 K/uL. Bone marrow biopsy revealed trilineal maturation without an abnormal infiltrate and normal cytogenetics and flow cytometry. Her spleen was enlarged, and the liver was infiltrated by adipose tissue. Her body mass index was 25.1 kg/m². She was believed to have steatohepatitis with pancytopenia secondary to hypersplenism.

Two years later, her pancytopenia and splenomegaly were unchanged. She now had fatigue, dyspnea, and fever (99°F) for 2 weeks. Her white blood cell count was 63,000/mm³ with 38% circulating blasts, hematocrit 27%, and platelets 57,000/mm³. A bone marrow biopsy showed 50% infiltration with mast cells and 50% myeloblasts, confirming the entity of SM-AHNMD (Figure 1). Results of an AML fluorescent in situ hybridization panel and routine cytogenetics were negative. She had a C-KIT D816V mutation but no JAK-2 mutation. Her serum tryptase level was 189 ng/mL (normal level, <11.4).

The patient was admitted to the hospital and underwent induction chemotherapy with cytosine arabinoside (Ara-C) (100 mg/m²/day by continuous infusion for 7 days) and idarubicin (12 mg/m²/day for 3 days). She was also started on dasatinib at 100 mg orally daily. Bone marrow biopsy 14 days after induction of treatment revealed persistent myeloblasts and mast cell infiltrate requiring a second course of therapy with 5 days of high-dose Ara-C (1 g/m²/day) and clofarabine (40 mg/m²/day). Because of the persistent mast cell infiltrate, dasatinib was discontinued. Her blood counts recovered on discharge, except for a platelet count of 40,000 K/uL. Her white blood cell count was 8,900 K/uL, and her hematocrit was 32.2%.

Repeat bone marrow biopsy showed no residual myeloblasts, with residual mast cells of 15%. Her tryptase level decreased to 77 ng/mL. She was readmitted 3 weeks later for consolidation chemotherapy with clofarabine/Ara-C. Four weeks later she had a stem cell allograft using an unrelated donor with a preparative regimen of busulfan and cyclophosphamide. Follow-up marrow revealed no evidence of AML, 5% residual mast cell infiltrate, and focal increased reticular fibrosis.

DISCUSSION
The diagnosis of SM-AHNMD may be difficult to establish, as the histologic and cytologic features of systemic mastocytosis...
Systemic mastocytosis with associated acute myelogenous leukemia

(SM) may be masked by the associated malignancy. The diagnosis can only be made when there is clear morphologic evidence of both SM with multifocal tissue infiltrates and an AHNMD, as in this case (4). Malignant mast cells may abnormally express CD2 and/or CD25, which may be detected by immunochemistry or flow cytometry. This is helpful in distinguishing neoplastic mast cells (CD2− and/or CD25+) from reactive mast cells (CD2+ and CD25−). Activating c-kit mutations are considered the hallmark of neoplastic mast cells (5).

The pathogenesis of SM associated with AHNMD is unknown, and the non–mast cell lineage component might or might not show evidence of the same c-kit mutation seen in the neoplastic mast cells. When there is an associated myeloid neoplasm, there are two proposed theories for the pathogenesis. One theory involves an activating c-kit mutation that occurs with other genetic mutations and events in a myeloid stem cell (6, 7). The c-kit mutation could result in a proliferative advantage to the mutated stem cell and lead to mast cell differentiation and proliferation (8). Another possible mechanism is transformation of a subclone of the myeloid progenitor cells through an acquired c-kit mutation resulting in a coexisting mastocytosis (9). The association with c-kit mutations in SM associated with lymphoid neoplasms is even less apparent, as mutations have not been reported in these cases.

It is important to distinguish SM-AHNMD from other entities associated with mast cell differentiation. These include tryptase-positive AML, MDS with prominent involvement of the mast cell lineage, and systemic mastocytosis associated with the hypereosinophilic syndrome and myeloproliferative disorders associated with PDGFRα or PDGFRβ fusion genes. None of the aforementioned entities would be classified as SM-AHNMD. Among patients with SM-AHNMD, those with SM-MPN have a significantly longer median survival than patients with SM-CMML (chronic myelomonocytic leukemia), SM-MDS, and SM-AML, which has the worst prognosis (3).

We initially treated our patient with a standard AML regimen of Ara-C/idarubicin, adding dasatinib, which has been reported to induce apoptosis of leukemia cells expressing c-KIT. The combination of drugs induced molecular remission in a similar patient reported by Ustun et al (10). Clofarabine was added along with a second course of Ara-C when persistent disease was found after the initial cycle of therapy. Phase II studies from M. D. Anderson Center as well as Baylor University Medical Center at Dallas showed that the combination of clofarabine and Ara-C is effective in both untreated and previously treated patients with AML and can serve as a bridge to transplantation in older patients with AML. Our patient did achieve a complete remission of AML with this regimen, albeit there was a persistent mast cell infiltrate. Clofarabine is an adenosine deaminase analog similar to fludarabine and cladribine. In fact, cladribine as a single agent is an effective drug to treat systemic mastocytosis, with all nine patients treated with this drug having a partial response, as reported by Hanneke et al (11). Finally, in our patient there was a further decrease in the mast cell infiltrate 4 weeks after transplant.
Smooth muscle neoplasms of the vulva masquerading as Bartholin gland duct cysts

Rebecca A. Levy, MD, Whitney M. Winham, MD, Christopher S. Bryant, MD, and Charles M. Quick, MD

Smooth muscle neoplasms of the vulva can be mistaken for Bartholin duct cysts, which can lead to a delay in diagnosis. We present a case of vulvar leiomyoma and a case of leiomyosarcoma that clinically mimicked Bartholin duct cysts. Identification of leiomyosarcomas in this region is particularly important; due to the risk of recurrence, patients may need radiation and/or chemotherapy in addition to adequate surgical treatment and appropriate follow up. Prior series have shown that risk of recurrence is related to inadequate resection and not to the size or grade of tumor. It is critical that pathologists recognize smooth muscle tumors of the vulva and communicate to clinicians the importance of clear margins and wide local excision in cases of malignancy.

Leiomyomas, benign soft tissue tumors that arise from smooth muscle, account for approximately 3.8% of all benign soft tissue tumors (1). While they can develop anywhere in the body where smooth muscle is present, the most common site is the uterine myometrium (2). External genital leiomyomas arising within Bartholin glands are rare and usually mimic a Bartholin gland cyst. Leiomyomas are typically single mass lesions that are easily excised and contain histologically bland spindled cells that demonstrate estrogen and progesterone receptor positivity with immunohistochemical evaluation. Leiomyomas express smooth muscle markers by immunohistochemical stains, including desmin, smooth muscle actin, and muscle-specific actin.

Sarcomas account for only 1% to 2% of tumors arising in the vulva (3). Leiomyosarcomas are the most common type of sarcoma presenting in the vulva, and they are believed to arise from the smooth muscles within erectile tissue, blood vessels, rough ligaments, and erector-pili muscles (4). Most of the literature characterizing vulvar smooth muscle tumors comprises single case reports with reviews of the literature, and few large case series exist. The largest case series reported recurrence in 10 out of 25 vulvar and vaginal sarcomas, which required re-excision and radiation treatment. The overall 5-year survival rate was 70% (5).

CASE REPORTS

Patient 1. A 50-year-old postmenopausal woman presented with a large left labial mass in the area of the Bartholin glands. It had been slowly increasing in size over the past 5 years. She denied pain, bleeding, discharge, or pruritus. The mass was initially drained, as it was clinically believed to be a cystic lesion, but no fluid could be aspirated. The patient had lost a significant amount of weight over the previous 2 years, but had been on a rigorous diet and exercise program. Other significant medical history included coronary artery disease with coronary artery bypass grafting, hypertension, and diabetes mellitus. A 6 × 4 cm mobile, solid mass was present on the left labia majora free from underlying levator muscles. No evidence of erythema, bleeding, or discharge was noted.

An elective excision was performed under local anesthesia. The mass was easily removed and was not adherent to the levator muscles, rectum, vagina, or pubic ramus. The mass was removed in fragments, the largest of which measured 6.5 × 5.5 × 2.5 cm; the remaining tissue fragments measured 3.0 × 2.0 × 1.5 cm in aggregate. The tissue fragments had tan-white smooth cut surfaces. On microscopy, all sections contained interweaving fascicles of bland spindled cells with well-circumscribed margins (Figure 1a). There was minimal to no cytologic atypia, less than 2 mitoses per 10 high-power fields (HPF), and no necrosis. Smooth muscle actin immunohistochemical stain highlighted the smooth muscle cells, confirming the diagnosis of benign leiomyoma (Figure 1b).

Patient 2. A 57-year-old postmenopausal woman had a 4 × 2 cm mass in the perineal region of the left labia that was tender and uncomfortable and had increased in size over the past 4 to 6 weeks. She denied pain, bleeding, discharge, or pruritus. The mass was clinically diagnosed as a Bartholin gland duct cyst and drainage was attempted, but no fluid could be aspirated.

An elective excision was performed under general anesthesia. The mass was easily removed from the left perineal region.

From the Department of Pathology, Baylor University Medical Center at Dallas (Levy); Pathology Associates of Albuquerque, Albuquerque, New Mexico (Winham); the Department of Gynecologic Oncology, NEA Baptist Clinic, Jonesboro, Arkansas (Bryant); and the Department of Pathology, the University of Arkansas for Medical Sciences, Little Rock, Arkansas (Quick).

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It measured 2.5 cm and was composed of tan-pink, soft tissue. On microscopy, sections showed interlacing fascicles of spindled cells with diffuse pleomorphism (Figure 2a), increased mitotic activity (up to 16 mitoses per 10 HPF with atypical forms) (Figure 2b), and a focally infiltrative border. The combination of these three features was sufficient for the diagnosis of leiomyosarcoma. Immunohistochemical stains for smooth muscle actin and desmin highlighted the smooth muscle cells, confirming the diagnosis of leiomyosarcoma. The neoplasm was present at the surgical margin, and additional therapy was recommended. The clinician was contacted to discuss the unexpected results and the significance of a positive surgical margin, which expedited the referral to a gynecologic oncologist for radical vulvectomy. Radical excision was performed and no residual disease was identified.

**DISCUSSION**

We present two cases of vulvar smooth muscle tumors that clinically mimicked Bartholin gland cysts. These cases suggest that a biopsy should be performed, rather than a drainage procedure, if the mass appears firm or solid on palpation, is ulcerated instead of smooth, or presents in a slightly different location than the usual region of the Bartholin ducts (6). Histologic evaluation is necessary for diagnosis. While vulvar leiomyosarcomas are rare, they do occur in the same location as Bartholin duct cysts. Initial clinical misdiagnosis as a Bartholin...
duct cyst can result in a delay of diagnosis and worse prognosis (7).

Both leiomyomas and leiomyosarcomas are immunopositive for muscle markers, including desmin, smooth muscle actin, and muscle-specific actin, and they can be focally positive for S-100 and cytokeratin. The diagnosis of extrauterine leiomyosarcomas in the gynecologic tract requires the presence of at least three of the following characteristics: a diameter >5 cm, infiltrative margins, >5 mitotic figures per 10 HPF, and moderate to severe cytologic atypia. Lesions that have only one of these characteristics should be diagnosed as leiomyomas, and cases with two characteristics should be considered atypical leiomyomas (8).

Due to the low incidence of these tumors, there are no evidence-based diagnostic algorithms or published recommendations for treatment. However, prior reports have recommended surgical excision with the potential addition of radiation therapy. Decisions are made based upon the individual case presentation and pathology evaluation. Leiomyosarcomas are generally treated by complete excision with a goal of pathologic confirmation of negative margins. Conversations between pathologists and clinicians can provide guidance to ensure adequate surgical excisions are performed. Prior studies have shown that risk of recurrence is most closely related to inadequate resection of margins (9). The overall prognosis is best correlated to histologic grade (5). Close monitoring of the patient is advised, as these entities have almost a 50% recurrence rate (5).

The value of adjuvant chemotherapy is uncertain but has produced regression of metastases in vulvar sarcomas (9). Adjuvant chemotherapy and radiation therapy for completely resected low-grade mesenchymal tumors have not been shown to improve outcomes (5, 5). Small case series have shown benefit in treating high-grade sarcomas or recurrent low-grade sarcomas with postoperative radiation; however, it is very difficult to compare treatment regimens at different institutions as there are no standardized guidelines (5).

Multicentric Castleman’s disease and HIV
John R. Krause, MD, Sara D. Robinson, MD, and Estil A. Vance, MD

Multicentric Castleman’s disease (MCD) is a rare lymphoproliferative disorder found with a higher frequency in HIV-seropositive patients. Human herpes virus 8 is found in virtually all cases of HIV-associated MCD. The majority of cases of MCD in patients with HIV are also associated with Kaposi’s sarcoma. The dysregulated production of human IL-6 is thought to be an important factor in the pathogenesis of MCD. HIV-seropositive individuals with MCD have a significantly greater risk of developing non-Hodgkin lymphomas than their HIV-seronegative counterparts. MCD occurring in HIV patients has been associated with a poor prognosis. With newer therapy regimens, it is hoped that the prospects of HIV-infected patients with MCD will improve.

CASE PRESENTATION
A 43-year-old man was first diagnosed with HIV 1 year before presentation. He had been compliant with his antiretroviral therapy. One week before admission, his therapy was changed, as he had become resistant to efavirenz, emtricitabine, and tenofovir, as demonstrated by a viral load plateau. The patient subsequently developed a diffuse rash and fevers up to 100.6°F, initially thought to be drug related. He continued, however, to complain of fevers associated with diffuse myalgias and malaise. On exam, his heart rate was 112 beats/minute and his blood pressure was 99/56 mm Hg. Marked lymphadenopathy was noted in the cervical chains and axillary and inguinal areas bilaterally. The spleen tip was also palpable. Two small Kaposi’s sarcoma lesions (biopsy proven) were present on the right lower extremity and seemed to be fading.

Laboratory evaluations revealed a hematocrit of 21%, an HIV viral load of 444 copies/mL, and a CD4 count of 193 cells/mm³. Notably, the patient’s HHV-8 titer was >10,000,000 copies/mL. Other relevant laboratory results included an IL-6 > 29.7 pg/mL (normal value < 17.4), positive results on hepatitis B core antibody and hepatitis surface antibody tests, and negative results on hepatitis B surface antigen and hepatitis B viral DNA tests.

On biopsy, the bone marrow was normal with trilineage maturation. A lymph node biopsy revealed pathologic findings consistent with MCD. There were numerous follicles, some of which had penetrating small vessels (Figure 1a). Lymphocytes in the mantle zone were arranged in concentric circles (so called “onion skinning”). There was prominent interfollicular vascular proliferation with a pronounced plasma cell infiltrate. The plasma cells expressed IgM and were polytypic by flow cytometric analysis and immunohistochemistry stains. Large cells with vesicular nuclei, prominent nucleoli, and amphophilic cytoplasm (plasmablasts) were present in the mantle layer and interfollicular areas. Focal clusters of these plasmablasts encroached on the germinal centers, forming so-called microlymphomas (Figure 1b). HHV-8 was detected in the plasmablasts by in situ hybridization (Figure 1c). A test for Epstein Barr virus–encoded small RNA (EBER) was negative. The lesion was considered to be HHV-8–associated MCD with microfoci of large cell lymphoma (microlymphomas).

The patient underwent six cycles of rituximab, cyclophosphamide, doxorubicin, vincristine, and prednisone (R-CHOP21) with growth factor support and continues to do well clinically. After two cycles of R-CHOP21 (Day 1: intravenous rituximab 375 mg/m², intravenous cyclophosphamide 750 mg/m², a 24-hour intravenous infusion of doxorubicin 50 mg/m², and intravenous vincristine 1.4 mg/m², with oral prednisone 100 mg on Days 1–5), the patient had a complete clinical regression of all previous mentioned lymphadenopathy. An interim positron emission tomography (PET) scan showed resolution of extensive hypermetabolic activity involving multiple nodal stations above and below the diaphragm. All
previously pathologic lymph nodes were normal in size. A PET scan done after completion of chemotherapy showed no residual disease. The patient continues retroviral therapy, and his HIV load is now undetectable. He is also being treated with abacavir/lamivudine for hepatitis B. A follow-up HHV-8 DNA by polymerase chain reaction was <1000 copies/mL. An IL-6 level was not repeated.

DISCUSSION

MCD is a rare, aggressive lymphoproliferative disorder that has a poor prognosis usually requiring systemic chemotherapy (1–4). MCD is commonly associated with HHV-8, an oncogenic herpesvirus, and is most often seen in immunosuppressed individuals infected by HIV type 1 (5). The pathologic features of MCD strongly suggest a chronic antigen stimulation response, and HHV-8 has been found in virtually all cases of HIV-related MCD (6). The presentation is usually nonspecific, resulting in an extensive differential diagnosis that often results in a delay of the diagnosis. The diagnosis is established on the clinical presentation of a lymphoproliferative disorder with evidence of multisystem involvement and the classic histopathology on a lymph node biopsy as described in the case presentation. Those with MCD may develop lesions described previously as microlymphomas composed of plasmablasts. The plasmablasts typically reveal lambda light chain restriction but do not harbor somatic mutations in the rearranged immunoglobulin genes. With disease progression, frank plasmablastic lymphomas may develop (7, 8). It is interesting that these lymphomas are monoclonal, although the immunoglobulin genes remain unmutated (8). Compared with HIV-infected patients without MCD, those with MCD have a 15-fold increased risk of non-Hodgkin lymphomas, with the most common subtype of MCD being HHV-8–positive plasmablastic lymphoma.

It has long been recognized that the features of MCD strongly suggest a secondary antigen proliferation response. It has been hypothesized that an infectious agent could be the triggering antigen for the introduction of a pathological process via abnormal IL-6 production, unregulated by a defective immune system (9, 10). The IL-6 level in our case was elevated. HIV itself is highly replicated in lymphoid tissue and could play a role in the persistent B-cell activation (11). The IL-6 signaling pathway may play an important role in driving HHV-8–infected naive B cells to differentiate into plasmablasts (12). HHV-8 encodes for viral IL-6, an IL-6 homologue that has many of the biological activities of human IL-6 (13). Furthermore, elevated levels of IL-6 correlate with clinical symptoms and HHV-8 viral load (10, 12).

While the survival of patients with HIV and coexistent MCD and non-Hodgkin lymphoma is generally poor, with a median survival of 48 months (14, 15), there are exceptions. Researchers have documented success in treating patients with HIV-associated MCD with antivirals (16) and in treating AIDS-related lymphoma patients with highly active antiretroviral therapy, rituximab, and chemotherapy (17). Hopefully, the prospects of HIV-infected patients with HHV-8–associated MCD and plasmablastic lymphoma will also improve.

Disseminated Kaposi’s sarcoma without cutaneous involvement

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Kaposi’s sarcoma (KS) is a low-grade vascular tumor caused by infection with human herpesvirus 8. Prior to the AIDS epidemic, KS was rare in the United States. With the advent of highly active antiretroviral therapy, KS has become far less common, now occurring at a rate of about 6 cases per million people each year. It is still seen most commonly in those infected with HIV, and cutaneous manifestations represent the most common presentation. In this case, we describe a patient with disseminated AIDS-associated KS lacking cutaneous manifestations.

Kaposi’s sarcoma (KS) was first described in 1872 by Moritz Kaposi, a Hungarian dermatologist, as an “idiopathic multiple pigmented sarcoma of the skin” (1). KS is a low-grade vascular tumor associated with human herpesvirus 8 (HHV-8), also known as the KS-associated herpesvirus (2). KS can be classified into four types, organized by the clinical context in which it develops: classic, endemic, iatrogenic, and AIDS associated (2, 3). The most common of these is AIDS associated, occurring at a rate of about 6 cases per million people each year (4). AIDS-associated KS demonstrates wide clinical variability, ranging from minimal disease presenting incidentally to a rapidly progressive neoplasm resulting in significant morbidity and mortality. KS is most notable for its cutaneous involvement, characterized by dermal purplish, reddish blue, or dark black macules, plaques, and nodules (5). This well-documented lesion is AIDS defining and is not incredibly uncommon in those with a CD4 T cell count <200 cells/μL. In the absence of cutaneous involvement, KS may prove to be a cryptic diagnosis due to systemic manifestations that are difficult to discriminate from other disease processes, particularly in the setting of an immuno-compromised host.

CASE REPORT

A 42-year-old black man with known AIDS presented to the emergency department with a 1-week history of right-sided flank pain, with fever, chills, nonproductive cough, and dyspnea. His CD4 T cell count obtained approximately 2 months earlier was 12 cells/μL, with an HIV viral load of 253,100 copies/mL. He was being treated with efavirenz/emtricitabine/tenofovir but stated that his medication compliance had been intermittent over the past several months. He previously had been on lopinavir/ritonavir/abacavir/lamivudine, with a somewhat recent discontinuation. Due to the patient’s poor CD4 count and increasing viral load, it was suspected that resistance to his current medication regimen had developed.

Upon presentation, the patient was also on a prophylactic antibiotic regimen consisting of dapsone and azithromycin. Two months earlier, he had been hospitalized for an acute febrile illness of unknown origin. At that time the patient was treated empirically for mycobacterium avium complex and histoplasmosis with ethambutol, azithromycin, and itraconazole. The patient reported that approximately 1 week following hospital discharge, his recurrent fevers ceased and he was back to his previous baseline, which was the case until 5 days preceding this admission.

On physical examination, he was not in any apparent distress. He was afebrile, the heart rate was 121 beats per minute, the blood pressure was 117/69 mm Hg, and the arterial blood saturation was 88% on room air. His oxygen saturation improved to 98% with 2 L/min supplemental oxygen. Fine bilateral pulmonary rhonchi were heard. No visible skin lesions were seen. A 1 cm excoriated lesion was seen at the junction of the hard and soft palate, and a 1 cm fungating mass was seen at the tip of the uvula. The lymph nodes were enlarged in the cervical, submandibular, axillary, and inguinal regions. Laboratory results demonstrated pancytopenia with a white blood cell count of 3.2 × 1000/mm³ and platelets 27,000, as well as mild hyponatremia of 131 mmol/L. The initial arterial blood gas was pH 7.48 with a pO₂ of 65 mm Hg. The initial chest radiograph revealed the presence of bilateral diffuse airspace and interstitial opacities, consistent with a multilobar atypical pneumonia. A computed tomography scan of the chest, abdomen, and pelvis with intravenous contrast revealed the presence of a bilateral multilobar pneumonia, diffuse mesenteric edema, splenomegaly, and enlarged bilateral inguinal lymph nodes. He

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was treated empirically for *Pneumocystis jiroveci* pneumonia, and treatment for disseminated histoplasmosis and mycobacterium avium complex was reinitiated.

Approximately 24 hours following admission, a repeat chest radiograph demonstrated increasing bilateral opacities. The work of breathing had increased, and 4 L/min supplemental oxygen via nasal cannula was initiated. Arterial blood gas revealed a worsening pO₂ of 59 mm Hg. His oxygen requirement further increased to 10 L/min via nonrebreather mask to achieve a saturation of 92%, and he was electively intubated.

Following transfer to the intensive care unit, the patient’s highly active antiretroviral therapy (HAART) regimen was altered from efavirenz/emtricitabine/tenofovir back to lopinavir/ritonavir/abacavir/lamivudine. Pathologic specimens from a previous lymph node biopsy revealed positive HHV-8 staining, consistent with KS. Bronchoscopy, bone marrow biopsy, and lesion biopsy were nondiagnostic, with negative staining for *Pneumocystis jiroveci*. All empiric antibiotic and antifungal treatments were stopped after multiple negative diagnostic studies. He was started on doxorubicin treatment once every 3 weeks. Ventilator weaning was initiated and a tracheostomy placed. The patient demonstrated subjective and objective responsiveness to the doxorubicin treatment, with improved pulmonary infiltrates, decreased diffuse lymphadenopathy, and clinical improvement. After 20 days he was discharged to his home without supplemental oxygen.

**DISCUSSION**

KS is a multicentric neoplastic process that affects skin, vasculature, lymphatics, and viscera. Historically, KS has been a prominent clinical feature of AIDS. Before the advent of HAART, KS was over 20,000 times more common in AIDS patients than in the general population (6). The cumulative incidence of AIDS-associated KS has steadily declined since the 1980s, from 14% during the 1980s to 7% from 1990 to 1995 and 2% from 1996 to 2006 (7). This change is a direct reflection of the development of HAART with the introduction of zidovudine in 1987 in addition to an increase in HIV/AIDS awareness, increased diagnosis, and the timely initiation of HAART. KS has a wide variety of clinical presentations, from mild, with minimal lymph node involvement and cutaneous manifestations, to a more fulminant form that involves skin, lymph nodes, and viscera. In more disseminated forms, the gastrointestinal tract, lymph nodes, and lung are the most common areas of disease, but there have been reports of KS involving the central nervous system and the heart as well (8).

Our patient clearly presented with a disseminated or metastatic form of KS, with initial involvement of the lymphatics and subsequent development of rapidly progressive, fulminant pulmonary disease. While metastatic KS represents a less common disease variant, a detailed search revealed only one description of 11 patients with KS in whom cutaneous involvement was absent. In 2005, Stebbing and colleagues were the first to describe an HIV-infected cohort of 5932 patients, out of which only 11 were identified as having noncutaneous KS (9). Our patient presented with AIDS clinical trial group stage T11S1 disease, which was noted in just 3 of the 11 patients described by Stebbing and associates, possibly indicating an infrequent presentation of an already rare disease variant. Contributing to diagnostic difficulty is the fact that the AIDS population is especially susceptible to opportunistic as well as typical infections; lymphadenopathy and bilateral pulmonary infiltrates are not uncommon hospital presentations. This case highlights the importance of maintaining an expansive differential and obtaining tissue for diagnostics in treatment-unresponsive conditions in HIV/AIDS patients. Equally important is immediate access to an experienced multidisciplinary team with a comprehensive knowledge and understanding of HIV/AIDS-related pathology.

Mucocele of the appendix is a term used to describe a dilated, mucin-filled appendix. It is most commonly the result of epithelial proliferation, but can be caused by inflammation or obstruction of the appendix. Two cases of mucocele of the appendix are presented with a discussion of the histologic and radiologic features as well as the surgical management.

CASE REPORTS

Case 1. A 30-year-old man presented to the emergency department at Baylor University Medical Center at Dallas with a 1-day history of cramping abdominal pain with nausea, vomiting, and diarrhea. He reported mild tenderness to palpation in the left lower quadrant. The patient was afebrile with stable vital signs and a normal white blood cell count. A contrast-enhanced computed tomography (CT) study of the abdomen and pelvis revealed the stomach, small bowel, and colon to be fluid filled. These findings were compatible with the clinical impression of gastroenteritis. The appendix was dilated to 1.6 cm and filled with low-density material. Calcific deposits were present in the wall of the appendix, but there were no surrounding inflammatory changes (Figure 1a). The CT findings were compatible with a mucocele of the appendix, and a laparoscopic appendectomy was performed. Final pathology revealed a mucinous cystadenoma of the appendix.

Case 2. A 72-year-old man presented to the emergency department at Baylor University Medical Center at Dallas with vomiting and acute worsening of longstanding abdominal pain with localization to the right lower quadrant. He was in mild discomfort and had tenderness to palpation in the right lower quadrant, greatest at McBurney’s point. The patient had no peritoneal signs. A contrast-enhanced CT study of the abdomen and pelvis showed the appendix to be dilated to 2.7 cm and filled with low-density material. An appendicolith was also present at the base of the appendix (Figure 1b). The CT findings were compatible with a mucocele of the appendix, and a laparoscopic appendectomy was performed. Histologic study of the excised appendix revealed both chronic and acute inflammatory changes with mucin accumulation and evidence of previously ruptured appendiceal diverticulum.

Figure 1. Mucocele of the appendix. (a) Coronal CT image of the right lower quadrant in patient 1 shows a dilated appendix with thin calcification in the wall (white arrow). (b) Axial CT image of the right lower quadrant in patient 2 shows a dilated appendix with an appendicolith.
DISCUSSION

Mucocele of the appendix is a descriptive term that refers to dilation of the appendiceal lumen as a result of mucin accumulation and is based on the gross or macroscopic appearance of the appendix. Mucocele formation is most commonly caused by epithelial proliferation, either benign or malignant. Much less frequently, inflammatory or obstructive causes, to include appendicitis and obstruction by a fecolith or appendicolith, are the cause of mucocele formation.

Mucoceles are frequently discovered incidentally, as most are the result of a mucinous cystadenoma that causes no inflammation (2). When imaged with CT, a mucocele of the appendix will typically manifest as homogenous hypoattenuating material that has Hounsfield values similar to water filling the lumen of the appendix. The presence of curvilinear calcification in the wall of the appendix is highly suggestive of a mucocele (3). The spatial resolution of CT usually allows for a confident diagnosis of a dilated appendix. When extending into the pelvis of a woman, the appendix must be differentiated from the right ovary and fallopian tube, as a cystic ovarian neoplasm, tubo-ovarian abscess, and hydrosalpinx could have a similar appearance. Additional differential diagnoses include enteric duplication cyst, mesenteric cyst, and Meckel diverticulum.

Mucoceles are treated surgically, and the preoperative diagnosis aids in the planning of a careful mobilization and resection to prevent peritoneal contamination. A right hemicolectomy is frequently performed if a malignant cause is suspected based on imaging or on intraoperative frozen section (4). Right hemicolectomy was not performed in these cases because frozen section analysis at the time of surgery showed no malignant characteristics. Since the risk of developing an adenocarcinoma of the colon is six times greater in patients with a mucocele than in the general population, colonic surveillance is warranted in these cases (5).

Laryngeal actinomycosis
Forrester Lensing, MD, Travis Abele, MD, Richard Wiggins III, MD, and Edward Quigley, MD, PhD

Actinomyces odontolyticus, a component of normal human flora, has been implicated in cervicofacial actinomycosis, which most commonly involves the perimandibular soft tissues and is characterized by slowly progressive abscess and sinus tract formation. Actinomycosis has rarely been reported to involve the larynx, and the imaging findings of laryngeal involvement have not been reported. We present a case of laryngeal actinomycosis with findings on computed tomography, magnetic resonance imaging, and positron emission tomography.

Cervicofacial actinomycosis (CFA) is a rare but treatable infection that is more commonly seen in patients with poor dental hygiene, immunosuppressed patients, and patients with previous mucosal injury to the upper aerodigestive tract. Actinomycosis rarely involves the larynx and may be mistaken for a mucosal mass. We present a case of laryngeal actinomycosis and illustrate its salient imaging findings on computed tomography (CT), magnetic resonance imaging (MRI), and positron emission tomography (PET).

CASE DESCRIPTION
A 24-year-old man with a history of inhalational injury and subglottic stenosis had previously undergone multiple airway dilations beginning approximately 1 year before presentation. Two days following his most recent dilation, he presented with acute dyspnea and laryngeal pain. The area over the right thyroid cartilage was tender to palpation. Contrast-enhanced CT imaging of the neck demonstrated diffuse cricoid cartilage enlargement and effacement of adjacent fat planes (Figure 1). Contrast-enhanced MRI of the neck showed increased T2 signal and peripheral nodular enhancement throughout the cricoid cartilage with surrounding inflammation concerning for cricoiditis (Figure 2a, 2b). A pretreatment PET scan demonstrated increased metabolic activity within the cricoid cartilage, suggesting active infection (Figure 2c). The patient underwent urgent tracheostomy and biopsy. A culture of the biopsy specimen grew *Actinomyces odontolyticus*, a gram-positive anaerobe. The patient received intravenous penicillin for 6 weeks. Subsequent PET-CT imaging revealed resolution of hypermetabolic activity in the larynx and resolution of the soft tissue mass.

Figure 1. Axial contrast-enhanced CT scans of the neck in (a) soft tissue and (b) bone algorithms demonstrate low attenuation and inflammatory change in the cricoid region (arrow, a) with associated destruction of cricoid cartilage (arrow, b).

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DISCUSSION

Actinomycosis was originally described in 1878 by Israel, and the causative organism was isolated in 1891 by Wolfe (1). Actinomyces odontolyticus, a gram-positive anaerobe, is a component of normal human flora. It has been implicated in CFA (1). CFA has been called a “great masquerader” in diseases of the head and neck (2). Bacteria gain entry via a defect in the mucosa of the upper aerodigestive tract, and infection typically spreads without regard for tissue planes. CFA commonly presents as painless swelling over the mandible, which evolves into multiple abscesses and draining sinus tracts that emit characteristic sulfur granules. Risk factors for the development of CFA include poor dental hygiene, trauma, diabetes mellitus, immunosuppression, and treatment for head and neck neoplasm. Infection is usually treated with a prolonged course of oral penicillin; more complex cases may require surgery (1).

On CT imaging, CFA may present as an ill-defined soft tissue mass with adjacent infiltrative inflammatory change (3–5). Some studies have reported central low attenuation and nonenhancement (4, 5). On MRI, lesions demonstrate elevated T2 signal hyperintensity with destruction of cricoid and arytenoid cartilages; on PET, T2 signal hyperintensity in the cricoid cartilage with infiltration of adjacent fat planes, peripheral enhancement, and central necrosis; and on PET, increased metabolic activity that improves with penicillin therapy.

While rare, actinomycosis remains an important diagnostic consideration in the head and neck, especially when there is a clinical history of mucosal damage. While the imaging features are not specific, CFA is an infection that responds to antibiotics and should be considered before contemplating more invasive treatment approaches.

We describe a 55-year-old man who presented with a stroke resulting from active infective endocarditis (IE) involving a heavily calcified bicuspid aortic valve. The case highlights the infrequency of IE involving a heavily calcified valve, the inability of the infection to penetrate the calcific deposits, and the ability of the infection to spread to the adjacent soft tissues, leading to ring abscess and its multiple complications.

The aortic valve is the most common site for one or more vegetations to form in infective endocarditis (IE) (1). Since the introduction of corticosteroids and the increased frequency of immunotherapy and intravenous drug addiction, infection involving the aortic valve has most commonly involved a previously structurally normal valve. The next most common aortic valve to be involved by IE was a congenitally malformed bicuspid aortic valve that had functioned normally or had only mild dysfunction (2). IE involving a previously calcified valve is unusual and particularly so when the aortic valve is massively calcified. The present report was prompted by study of a patient who developed IE on a previously heavily calcified, severely stenotic aortic valve.

CASE DESCRIPTION

A 55-year-old white man, on chronic hemodialysis for end-stage renal disease believed to be secondary to diabetes mellitus, was hospitalized because of the sudden onset of confusion. Diabetes mellitus was diagnosed when he was 43 years old (2001), requiring insulin therapy by age 49. Systemic hypertension was diagnosed at age 50. He had a sedentary lifestyle and was obese (body mass index 35 kg/m²). Twelve months earlier, hemodialysis had been initiated; 7 months earlier, a malfunctioning right arm arteriovenous fistula had been repaired; and 1 month earlier, he presented with fever, nausea, vomiting, and abdominal pain. Methicillin-resistant *Staphylococcus aureus* bacteremia related to a right internal jugular PermaCath infection was diagnosed. During that admission, a grade 2/6 precordial systolic ejection murmur was heard. Echocardiography revealed a calcified stenotic bicuspid aortic valve with trace aortic regurgitation, and a small mobile mass attached to the aortic valve was seen. An aortic root abscess also was seen. He was discharged home to receive intravenous vancomycin for 6 weeks and then returned because of confusion. Repeat blood cultures again grew *Staphylococcus aureus*. He was treated with daptomycin.

On July 31, 2010, the aortic valve (bioprosthesis) and proximal portion of the ascending aorta were replaced (the latter was a homograft), the paravalvular abscess was debrided, and the coronary ostial sites were implanted into the homograft. The excised stenotic and infected aortic valve weighed 8.36 g and was congenitally bicuspid (Figure 1). Culture of the excised valve grew methicillin-resistant *Staphylococcus aureus*. The patient’s early postoperative course was complicated by episodes of paroxysmal atrial fibrillation and nonsustained ventricular tachycardia.

One month following the operation, the patient was back at home and continuing his hemodialysis treatments 3 times a week. A successful renal transplant was performed on September 13, 2012, and hemodialysis was discontinued. As of October 2013, he remains active and exercises 30 minutes a day at least 3 times a week. He is currently unemployed and on disability.

DISCUSSION

The patient described herein with end-stage renal disease requiring chronic hemodialysis had a heavily calcified stenotic congenitally bicuspid aortic valve and developed superimposed IE initiated as a result of infection at the percutaneous dialysis entry site. The infection, unable to grow well in the calcified valve, rapidly spread to the adjoining soft tissue, producing a ring abscess.

The unusual feature of the present patient is the development of IE on a massively calcified aortic valve. The normal aortic valve weighs about 0.4 g. Thus, the valve in the present patient (8.36 g) was 20 times heavier than normal, and most of that excessive weight was the result of the calcific deposits, not the superimposed vegetative material. Roberts and Ko (3) initially reported weights of operatively excised stenotic aortic valves in 2003 and from January 1998 to August 2013 had
weighed 1726 stenotic aortic valves: only 12 (0.7%) weighed >8 g, and none of the other 11 patients had IE. Indeed, the lighter the aortic valve, the greater the likelihood of its being complicated by IE (2).

IE involving a stenotic aortic valve is far less common than IE involving a nonstenotic aortic valve. Fernicola and Roberts (4) studied at necropsy 96 patients with active IE involving the aortic valve: 25 (26%) had underlying stenosis and 71 (74%) had an underlying nonstenotic valve. Of the 25 with underlying stenosis, 21 (84%) had a ring abscess and 10 (40%) had an underlying congenitally bicuspid valve; of the 71 with a nonstenotic aortic valve, 37 (52%) had a ring abscess ($P = 0.005$) and 21 (30%), a congenitally bicuspid valve (ns).

The patient described had two reasons for having a heavily calcified aortic valve: 1) the underlying bicuspid condition (2), and 2) the presence of end-stage renal disease with chronic hemodialysis (5).


Figure 1. (a) Photograph of the operatively excised stenotic aortic valve and (b) radiograph of the valve in the patient described.
In the electrocardiogram of this 69-year-old man (Figure), the rhythm strip of lead II best demonstrates the cardiac rhythm. There is sinus rhythm at a rate of 65 beats/min. The 1st, 5th, 9th, and 13th QRSs are capture complexes. Capture complexes are separated from one another by three wide (0.13s) QRSs that occur regularly at a rate of 86 beats/min; this is an accelerated (rate 60–110 beats/min) idioventricular rhythm (1). The first P wave in this tracing does not find the atrioventricular junction refractory and captures the ventricles; the second P falls in the first wide QRS; the third P falls in the T wave of the second wide QRS; and then the cycle repeats itself. The second and third P waves find the atrioventricular junction refractory and are not conducted to the ventricles. Thus, an accelerated idioventricular rhythm, by being faster than the sinus rhythm, intermittently usurps the ventricular pacemaker role, and the atria and ventricles are temporarily dissociated (incomplete atrioventricular dissociation) (2). Because both the sinus rhythm and the accelerated idioventricular rhythm are regular and because the capture beats reset the idioventricular rhythm, the group beating is not happenstance (2). Group beating may be defined as identical repetitive groups of complexes, here three idioventricular complexes, separated by identical pauses or different complexes, here single capture complexes. There are many other causes of group beating, with repetitive premature complexes and second-degree atrioventricular block leading the list.

The patient’s underlying disease is coronary arterial disease with an inferior myocardial infarct of indeterminate age, indicated by the pathological Q waves in the sinus-initiated complexes in leads II and III. The infarct was silent. The patient’s physician subsequently placed him on amiodarone because of ventricular ectopic beats. Amiodarone obviously has not prevented the ectopy, but has kept the rate slow when an idioventricular rhythm occurred.


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Irregular cardiac rhythm with combined rheumatic mitral stenosis and aortic stenosis

D. Luke Glancy, MD, and T. Griffin Gaines, MD

Electrocardiogram in a 56-year-old man revealed coarse atrial fibrillation with a controlled ventricular response, a single ventricular premature complex, left ventricular hypertrophy, and digitalis effect (Figure). The fibrillatory waves are large and superficially resemble atrial flutter, but unlike flutter waves, the waves are not uniform in voltage or timing. Coarse atrial fibrillatory waves, i.e., those with an amplitude >1 mm (0.1 mV), are more often associated with rheumatic valvular disease (1), congenital heart disease (2), or hypertrophic cardiomyopathy, whereas fine fibrillatory waveforms are more common in patients with atrial fibrillation caused by other etiologies.

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Figure. Electrocardiogram in a 56-year-old man. See text for explication.
waves are more often associated with atherosclerotic cardiac disease (1). Although any atrial fibrillation is a marker for left atrial enlargement, coarse atrial fibrillation appears to be a more specific marker (1, 3).

This patient had longstanding rheumatic heart disease with more severe mitral stenosis than regurgitation and significant aortic stenosis and regurgitation. The mitral disease was the major cause of his left atrial enlargement and atrial fibrillation. The aortic valve disease was the main reason for his left ventricular hypertrophy, manifested in the electrocardiogram by RV₅ > 26 mm (2.6 mV), RV₆ > 20 mm, SV₁ ≥ 30 mm, SV₁ + RV₅ or RV₆ > 35 mm, and SV₂ + RV₅ or RV₆ > 45 mm (4). The repolarization changes in leads V₄ to V₆ could be due to left ventricular hypertrophy, but the essentially isoelectric J points, rounded sagging of the ST segments, and small but upright T waves also suggest the effects of digoxin, a drug he was taking.

Because of symptomatic congestive heart failure, the patient underwent mitral and aortic valve replacement. He had an uneventful postoperative course.


Avocations

A young leopard in South Africa. Photo copyright © Jed Rosenthal, MD. Dr. Rosenthal is a cardiologist in Dallas, Texas (e-mail: jedr2@sbcglobal.net).
Energy and macronutrient intake of a female vegan cyclist during an 8-day mountain bike stage race

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This report describes the dietary intake of a vegan mountain biker (height, 161 cm; weight, 49.6 kg; body mass index, 19.1 kg/m²; relative peak power output, 4.6 W/kg) during the Transalp Challenge 2004 (altitude climbed, 22,500 m; total distance, 662 km), illustrating an aggressive dietary strategy that allowed the cyclist to be competitive. She finished the 8-stage event in 42 hours (mixed category, rank 16; 514 minutes behind the winners of this category), cycling with an average heart rate of 79.5% of laboratory-determined maximum, spending 892 minutes and 1627 minutes at intensities below and above 80%, respectively. During racing, the consumption of energy was 69.3 MJ (1.65 MJ/h), 65.76 MJ from carbohydrates (92 g/h), which was 35% of calories and 40% of carbohydrate total intake, and the fluid ingested was 3 L/day (570 mL/h), 55% of the total fluid consumed.

Mountain bike marathon stage races are very popular, with events such as the Transrockies Challenge attracting thousands of recreational, elite, and professional athletes. Although there are established nutritional guidelines for road cyclists (1, 2), the physiological demands of mountain bike competitions differ markedly from those of road cycling (3, 4), and for this reason the nutritional strategies might differ. Not only are the number of women participating in mountain bike stage events increasing, but probably the number of vegan cyclists is increasing too, given the background numbers of vegans. However, it is difficult to find a group of vegan cyclists participating in the same competition for large sample size studies. Contrary to the belief that the vegan diet is not optimal for athletes, we present the case of a woman who successfully completed a challenging mountain bike stage race while following a vegan diet.

CASE DESCRIPTION

One endurance-trained female amateur mountain biker (age, 30 years; height, 161 cm; weight, 49.6 kg; body mass index, 19.1 kg/m²; iron, 105 μg/dL [norm: 60–150 μg/dL]; ferritin, 133 ng/mL [norm: 15–150 ng/mL]; hemoglobin, 14 g/dL [norm: 12–16 g/dL]; hematocrit, 41% [norm: 35–49%]; vitamin B12, 280 pg/mL [norm: 200–950 pg/mL]; homocysteine, 7 μmol/L [norm: <14 μmol/L]) was recruited for this case report. She had successfully followed a vegan diet (rejecting all products from animal sources) since 1999 and had 16 years of experience in mountain bike sports, including participating in ultramarathons and stage races. In 2004 she started the Transalp Challenge (TAC) for the second time, having previously completed it in 2003.

TAC is a demanding 8-day race (5) requiring a cyclist to climb a total altitude of 22,500 m and ride a total distance of 662 km. For safety reasons, athletes have to compete in double teams. A total of 1074 professional and amateur mountain bikers participated in the TAC 2004, and winners in all categories were professional mountain bikers. In the TAC 2004, the overall winning team (men’s category) finished in 29 hours, 21 minutes, and 9 seconds.

To prepare for this multiday race, the rider trained for about 25 hours per week for almost a year. She performed an incremental laboratory cycling test (started at 100 W, with workload increased by 30 W every 5 min) on an electromagnetically braked ergometer (SRM GmbH, Jülich, Germany) before the start of the event. Relative peak power output (PPO) was 4.6 W/kg. During the race, her heart rate (HR) was continuously recorded, and data were analyzed using software (S710 and 4SW, Polar Electro Oy, Kempele, Finland). The relative intensity of exercise was expressed as percentage of laboratory-determined maximum HR (HRMAXLab: 182 bpm) and absolute PPO (PPOABSOLUTE Lab: 230 W). After each stage of the race, her body mass was measured and she rated how hard the race was overall, using Borg’s rate of perceived exertion (RPE) scale.

The female mountain biker finished in 41 hours, 59 minutes, and 45 seconds, achieving a final ranking of 16th place within the mixed category. Time spent in HR ranges corresponding to <70%, 70%–80%, 80%–90%, and 90%–100% of HRMAXLab were 314 (± 24) min, 578 (± 50) min, 1350 (± 69) min, and 277 (± 75) min, which is 12.5% (± 7.7%), 22.9% (± 12.2%), 53.6% (± 20.3), and 11.0% (± 25.6%) of total runtime, respectively. The characteristics of the course profile and the exercise intensity details are shown in Table 1.
Her dietary plan was based on experience gained in the TAC 2003 and was individually calculated using the current recommendations for cyclists involved in stages races (6, 7). The main goals in preparing the dietary plan were to replace energy, mainly by providing carbohydrates, and to replace fluid needs during daily racing (approximated: energy of 6 MJ, carbohydrates of 70–75 g/h, fluid of 2–4 L). The plan further aimed at providing constant energy and to replace fluid needs mainly by providing carbohydrates, and to replace fluid needs strictly kept in order to maximize recovery. Sleeping times were strictly kept in order to maximize recovery.

There were no major problems in implementing and conducting the plan. Despite a variety of flavors and good tolerance, over the 8 days the woman gradually became weary of the sweet taste of energy-dense supplements consumed exclusively during racing. She preferred salty, spicy, and savory snacks, foods, and meals (prerace/postrace). Even though she felt permanently satiated, she tried to eat and drink constantly to provide sufficient energy, carbohydrates, and fluid to meet the nutritional requirements and for optimum recovery. Sleeping times were strictly kept in order to maximize recovery.

The results of dietary intake are shown in Tables 2 and 3 and Figure 1. Due to the early start time (8 am), carbohydrate intake (188 ± 9.8 g/day, 3.8 g/kg) and fluid intake (200 ± 10 mL) were limited at breakfast. During racing, the energy exclusively came from energy-dense supplements, with liquid gels (35.32 ± 1.08 MJ) as the major source of energy (50.9%) and carbohydrates (53.9%). The carbohydrates consumed contributed 40% of overall carbohydrate intake during the TAC 2004. The fluid intake while racing (3 ± 0.8 L/day, 570 mL/h, 12 mL/kg*h) came exclusively from isotonic sport drinks (carbohydrates, 59 g/L; sodium, 350 mg/L), providing 54.7% of total fluid intake (5.5 ± 1.3 L/day), which contributed 29% of energy intake (20.20 ± 0.68 MJ) and 30.6% of carbohydrate intake during the Transalp Challenge 2004.

### Table 1. Characteristics of course profile and exercise intensity during the Transalp Challenge 2004

<table>
<thead>
<tr>
<th>Stage</th>
<th>Temperature (°C)</th>
<th>Humidity (relative) (%)</th>
<th>Stage distance (km)</th>
<th>Speed (km/h)</th>
<th>HRAVERAGE (beats/min)</th>
<th>%HRMAXLab</th>
<th>HRMAX (beats/min)</th>
<th>POAVERAGE (Watt)</th>
<th>POAVERAGE (%PPOABSOLUTELab)</th>
<th>POMAX (%PPOABSOLUTELab)</th>
<th>POMAX (Watt)</th>
<th>Body mass (kg)</th>
<th>Body fat (%)</th>
<th>RPE (6–20) (points)</th>
<th>Total altitude climbed (m)</th>
<th>Distance (km)</th>
<th>Total altitude (m)</th>
<th>Distance (km)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 1</td>
<td>28</td>
<td>45</td>
<td>80</td>
<td>16.4 ± 1.2</td>
<td>146 ± 15</td>
<td>90.1</td>
<td>181</td>
<td>208 ± 25</td>
<td>90.4</td>
<td>97.0</td>
<td>223</td>
<td>48.2</td>
<td>45</td>
<td>15</td>
<td>2398</td>
<td>43.8</td>
<td>2512</td>
<td>29.1</td>
</tr>
<tr>
<td>Stage 2</td>
<td>24</td>
<td>45</td>
<td>73</td>
<td>13.4 ± 1.1</td>
<td>144 ± 16</td>
<td>80.2</td>
<td>164</td>
<td>166 ± 26</td>
<td>72.2</td>
<td>83.9</td>
<td>196</td>
<td>49.6</td>
<td>45</td>
<td>17</td>
<td>3099</td>
<td>43.9</td>
<td>2619</td>
<td>26.4</td>
</tr>
<tr>
<td>Stage 3</td>
<td>24</td>
<td>44</td>
<td>74</td>
<td>15.5 ± 1.3</td>
<td>143 ± 13</td>
<td>79.1</td>
<td>164</td>
<td>170 ± 72</td>
<td>73.9</td>
<td>83.9</td>
<td>193</td>
<td>48.1</td>
<td>44</td>
<td>19</td>
<td>2619</td>
<td>39.7</td>
<td>2619</td>
<td>26.8</td>
</tr>
<tr>
<td>Stage 4</td>
<td>29</td>
<td>50</td>
<td>119</td>
<td>15.7 ± 1.6</td>
<td>145 ± 17</td>
<td>78.6</td>
<td>162</td>
<td>165 ± 75</td>
<td>71.7</td>
<td>83.9</td>
<td>193</td>
<td>49.2</td>
<td>42</td>
<td>14</td>
<td>3366</td>
<td>46.3</td>
<td>4030</td>
<td>67.1</td>
</tr>
<tr>
<td>Stage 5</td>
<td>32</td>
<td>45</td>
<td>54</td>
<td>14.4 ± 1.0</td>
<td>142 ± 17</td>
<td>79.7</td>
<td>163</td>
<td>167 ± 29</td>
<td>72.6</td>
<td>83.9</td>
<td>193</td>
<td>49.7</td>
<td>49</td>
<td>15</td>
<td>2103</td>
<td>23.1</td>
<td>4030</td>
<td>27.5</td>
</tr>
<tr>
<td>Stage 6</td>
<td>33</td>
<td>40</td>
<td>73</td>
<td>15.6 ± 1.2</td>
<td>139 ± 14</td>
<td>78.0</td>
<td>162</td>
<td>160 ± 31</td>
<td>69.6</td>
<td>83.9</td>
<td>193</td>
<td>49.9</td>
<td>49</td>
<td>17</td>
<td>2732</td>
<td>34.7</td>
<td>2333</td>
<td>27.5</td>
</tr>
<tr>
<td>Stage 7</td>
<td>28</td>
<td>40</td>
<td>124</td>
<td>14.5 ± 0.9</td>
<td>134 ± 18</td>
<td>76.0</td>
<td>158</td>
<td>151 ± 22</td>
<td>65.7</td>
<td>80.0</td>
<td>184</td>
<td>48.6</td>
<td>43</td>
<td>18</td>
<td>3995</td>
<td>69.1</td>
<td>3263</td>
<td>34.9</td>
</tr>
<tr>
<td>Stage 8</td>
<td>22</td>
<td>45</td>
<td>124</td>
<td>15.6 ± 1.5</td>
<td>145 ± 17</td>
<td>73.8</td>
<td>154</td>
<td>148 ± 28</td>
<td>64.4</td>
<td>75.7</td>
<td>174</td>
<td>49.3</td>
<td>49</td>
<td>16</td>
<td>2141</td>
<td>14.7</td>
<td>3234</td>
<td>34.9</td>
</tr>
</tbody>
</table>

 Mean ± SD

HR indicates heart rate; PO, power output and PPO, peak PO (both based on laboratory testing); RPE, rate of perceived exertion.

January 2014 Energy and macronutrient intake of a female vegan cyclist during an 8-day mountain bike stage race
intake. Rehydration through water only (2.1 ± 0.7 L/day) was combined with sodium-containing foods plus added salt. Total daily sodium intake was 1,402 ± 534 mg, with sport drinks as the major contributor (74.8%).

**DISCUSSION**

This report describes a woman's nutritional behavior during an 8-day mountain bike race and shows that the athlete was able to implement the planned nutritional strategy. Moreover, the relatively stable body mass indicates that carbohydrate replacement and hydration strategies were adequate. Therefore, a carefully developed and diligently implemented strategy plays a key role in both completing such events and achieving an athlete's goals, but discipline in executing a nutrition plan over consecutive days of racing is another factor.

The high energy intake found during the TAC 2004 can be explained by the characteristics of off-road competitions. In the face of both the environmental conditions and exercise intensity, energy-dense liquids (gels and sport drinks) were important contributors of energy (80.1%), carbohydrates (84.2%), and sodium (99.9%) during racing, allowing the woman to perform better than expected. Her hourly carbohydrate ingestion (1.2 g/kg*h, 92 g/h) was in accordance with current guidelines—1–1.5 g/kg*h (3) or 80–90 g/h (10)—but

**Table 2. Voluntary dietary intake during the Transalp Challenge 2004**

<table>
<thead>
<tr>
<th>Stage</th>
<th>Time</th>
<th>Foods</th>
<th>Fluids</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Prerace</td>
<td>1 dark bread, 1 pâté (tin), cereals (with hot water), 2 dried fruits</td>
<td>1 tea</td>
</tr>
<tr>
<td></td>
<td>Race</td>
<td>8 energy gels, 2 energy bars</td>
<td>3 L isotonic sports drink</td>
</tr>
<tr>
<td></td>
<td>Postrace</td>
<td>2 bananas, salad, 3 (big) pasta, 8 sweets</td>
<td>Water (1.8 L)</td>
</tr>
<tr>
<td>2</td>
<td>Prerace</td>
<td>4 dark bread, jam</td>
<td>2 tea</td>
</tr>
<tr>
<td></td>
<td>Race</td>
<td>10 energy gels, 2 energy bars</td>
<td>3 L isotonic sports drink</td>
</tr>
<tr>
<td></td>
<td>Postrace</td>
<td>1 banana, salad, 2 (big) pasta, 1 pizza, 16 sweets</td>
<td>Water (1.8 L)</td>
</tr>
<tr>
<td>3</td>
<td>Prerace</td>
<td>2 dark bread, 1 roll, jam</td>
<td>2 tea</td>
</tr>
<tr>
<td></td>
<td>Race</td>
<td>12 energy gels, 2 energy bars</td>
<td>3 L isotonic sports drink</td>
</tr>
<tr>
<td></td>
<td>Postrace</td>
<td>1 banana, 2 apricots, 0.5 kg of white bread, roasted potatoes (1 portion), 10 sweets</td>
<td>Water (1 L)</td>
</tr>
<tr>
<td>4</td>
<td>Prerace</td>
<td>4 dark bread, cereals (with hot water)</td>
<td>2 tea</td>
</tr>
<tr>
<td></td>
<td>Race</td>
<td>8 energy gels, 2 energy bars</td>
<td>3 L isotonic sports drink</td>
</tr>
<tr>
<td></td>
<td>Postrace</td>
<td>2 bananas, 1 pasta, 1 pizza, 8 sweets</td>
<td>Water (1.5 L)</td>
</tr>
<tr>
<td>5</td>
<td>Prerace</td>
<td>3 dark bread, jam</td>
<td>2 tea</td>
</tr>
<tr>
<td></td>
<td>Race</td>
<td>8 energy gels, 2 energy bars</td>
<td>3 L isotonic sports drink</td>
</tr>
<tr>
<td></td>
<td>Postrace</td>
<td>2 bananas, 8 buns, ½ salad, 1 pasta, 1 pizza, 6 sweets</td>
<td>Water (3 L)</td>
</tr>
<tr>
<td>6</td>
<td>Prerace</td>
<td>2½ rolls, jam</td>
<td>1 tea</td>
</tr>
<tr>
<td></td>
<td>Race</td>
<td>8 energy gels, 1 energy bar</td>
<td>3 L isotonic sports drink</td>
</tr>
<tr>
<td></td>
<td>Postrace</td>
<td>3 bananas, 4 apricots, 4 buns, 2 pasta, 1 pizza, 8 sweets</td>
<td>Water (2.5 L)</td>
</tr>
<tr>
<td>7</td>
<td>Prerace</td>
<td>2 dark bread, jam</td>
<td>2 tea</td>
</tr>
<tr>
<td></td>
<td>Race</td>
<td>14 energy gels, 3 energy bars</td>
<td>4.5 L isotonic sports drink</td>
</tr>
<tr>
<td></td>
<td>Postrace</td>
<td>3 bananas, 4 buns, 4 bruschetta, ½ salad, 2 pizzas, 10 sweets</td>
<td>Water (3 L)</td>
</tr>
<tr>
<td>8</td>
<td>Prerace</td>
<td>1 dark bread, 2 rolls, jam, 4 dried fruits</td>
<td>1 tea</td>
</tr>
<tr>
<td></td>
<td>Race</td>
<td>8 energy gels, 1 energy bar</td>
<td>1.5 L isotonic sports drink</td>
</tr>
<tr>
<td></td>
<td>Postrace</td>
<td>4 buns, 2 salads (1 small, 1 big), 1 pasta, 1 pizza, white grapes, 12 sweets</td>
<td>Water (2.5 L), 6 schnapps (jiggers), 5 Prosecco, 4 red wine (glasses)</td>
</tr>
</tbody>
</table>

*Bread (slice); tea (125 mL/cup); pasta (with tomato sauce, portion).”

**Table 3. Total macronutrient contribution for whole Transalp Challenge 2004 presented as absolute (± SD) and relative values**

<table>
<thead>
<tr>
<th></th>
<th>MJ/day Mean ± SD</th>
<th>% Meal El</th>
<th>% Total El</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prerace</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CHO</td>
<td>3.8 ± 1.35</td>
<td>75.3%</td>
<td>83.3%</td>
</tr>
<tr>
<td>Protein</td>
<td>0.5 ± 0.22</td>
<td>10.1%</td>
<td>12.2%</td>
</tr>
<tr>
<td>Fat</td>
<td>0.3 ± 0.36</td>
<td>14.6%</td>
<td>17.4%</td>
</tr>
<tr>
<td>Race</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CHO</td>
<td>9.8 ± 2.10</td>
<td>94.9%</td>
<td>100%</td>
</tr>
<tr>
<td>Protein</td>
<td>0.3 ± 0.02</td>
<td>2.6%</td>
<td></td>
</tr>
<tr>
<td>Fat</td>
<td>0.1 ± 0.01</td>
<td>2.5%</td>
<td></td>
</tr>
<tr>
<td>Postrace</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CHO</td>
<td>10.8 ± 3.08</td>
<td>77.7%</td>
<td>100%</td>
</tr>
<tr>
<td>Protein</td>
<td>1.4 ± 0.37</td>
<td>10.1%</td>
<td></td>
</tr>
<tr>
<td>Fat</td>
<td>0.7 ± 0.30</td>
<td>12.2%</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>27.8 ± 7.03</td>
<td>100%</td>
<td></td>
</tr>
<tr>
<td>CHO</td>
<td>24.4 ± 5.22</td>
<td>83.3%</td>
<td></td>
</tr>
<tr>
<td>Protein</td>
<td>2.2 ± 0.28</td>
<td>7.5%</td>
<td></td>
</tr>
<tr>
<td>Fat</td>
<td>1.2 ± 0.54</td>
<td>9.2%</td>
<td></td>
</tr>
</tbody>
</table>

CHO indicates carbohydrate; El, energy intake.
her carbohydrate intake was twice that recommended for athletes involved in prolonged stage races (≥4–6 h of high intensive cycling: 10–13 g/kg·day) for optimal recovery during 24 hours (1, 2). With an energy intake of 1.65 MJ/h, she further exceeded the hourly recommended energy to be maintained while racing (1 MJ/h) (1).

A study performed on the voluntary food intake of elite female cyclists (11) found that a higher energy intake during a 5-day stage race (14.87 MJ/day) resulted from increased carbohydrate intake (10 g/kg·day). The same was found in our athlete. In line with the considerably lower intakes from energy (17.05 MJ/day, 0.96 MJ/h) and carbohydrates (52.52 g/h) during the TAC 2007 (12), as well as the lower fluid intake normalized to body mass during the TAC 2008 (8.24 mL/kg·h) (13) compared to the current findings, the cyclists completing the TAC 2007 and 2008 were respectively slower (15.3 km/h and 14.4 km/h) than the female mountain biker.

Protein intake was markedly higher than recommended for vegetarian athletes and those involved in multiday ultraendurance events (1.2–1.8 g/kg·day) (10). However, due to the minimal protein provided by the supplements during racing, its percentage to overall calories was lower than anticipated.

There is sufficient evidence from the laboratory and field that an appropriately planned vegan diet can meet recommended levels of dietary needs for a competitive athlete (14). The current results confirm this, and furthermore confirm that a well-planned and implemented vegan diet is compatible with ultraendurance mountain biking. However, given the scarcity of literature on the vegan diet in endurance sports, the nutritional behavior presented highlights the importance of maintaining high carbohydrate levels in meeting the energy demands of such events and can aid the understanding of how to cope with the needs of stage races while following a vegan diet. A nutritional regime like the one described can be useful to athletes who have adopted the vegan diet, as well as to coaches and sport dieticians in developing adequate strategies and designing individualized interventions to meet the nutritional challenges of demanding mountain bike stage races and the requirements of vegan endurance athletes.

Baylor Plano consistently performed within the top 10% of hospitals nationwide for a variety of key health care quality measures, including reducing pressure ulcers, preventing blood clots, increasing the efficiency and speed of the discharge process, and minimizing operating room turnaround time. They also cited patient satisfaction surveys for the past 5 years that have rated Baylor Plano’s inpatient, outpatient, and ambulatory surgery services with scores of 90% or higher, exceeding the Press Ganey top 10% national benchmarks.

Heart transplant program gets pumping

In November 2012, Baylor University Medical Center at Dallas (BUMC) made some big changes to its cardiac transplant program. A year later, record-breaking results have made BUMC home to the busiest heart transplantation program in the state and one of the busiest in the nation. In fact, during the first half of 2013, it ranked fourth in the country by volume.

The major changes to the program involved both people and processes. “One of the things we did was increase the range for getting donor hearts,” explained Charlene Cink, MS, RN, director, BUMC Heart and Lung Transplant Program and Mechanical Circulatory Support. “We also initiated a new process to match a patient with a potential donor heart when it becomes available.” In addition to these process changes, a new team of cardiac transplant surgeons with almost 40 years of combined experience were recruited to help lead the program. Their areas of specialization include adult cardiac surgery, reoperations, bypass surgery and valve surgery, mechanical circulatory support, cardiopulmonary transplantation, aorta and root, and adult congenital and general thoracic surgery.

The impact of the new team was immediate. They performed 23 heart transplants in the last 6 weeks of 2012 alone,” said Cink. That’s more heart transplants than BUMC performed during the entire first 10½ months of 2012. Since coming to BUMC last November, the team has performed more than 80 heart transplants. Prior to 2012’s 43 transplants, the most heart transplants BUMC had ever performed in a calendar year was 32 in 1991. “This year [2013] is the highest our volumes have ever been by far,” said Cink.

In addition to heart transplantation, BUMC offers patients with severe heart failure an expanded portfolio of interventions. For years, BUMC has had one of the nation’s leading left ventricular assist device (LVAD) programs, but the mechanical circulatory support program now also offers extracorporeal membrane oxygenation (ECMO). “Unlike temporary LVADs, which support only the left ventricle, ECMO can support both heart ventricles, as well as the lungs,” explained Cink. ECMO may be used to stabilize a patient, allowing physicians to determine if he or she is a candidate for a longer-term option, such as an implantable ventricular assist device, transplant, or conventional open-heart surgery. Because ECMO is often needed on an emergency basis, BUMC has established a rapid response team with CareFlite, where patients with failing hearts throughout North Texas can be transported with ECMO to BUMC.

Baylor Precision Medicine Institute makes it personal

When physicians on the medical staff at BUMC face a particularly challenging case, they can now call on the team at Baylor Precision Medicine Institute. The team at the institute aims to replace the traditional one-size-fits-all medicine paradigm with one that focuses on individualized patient care using specific genetic profiles and medical histories. It offers patients advanced diagnostic and treatment options, including access to clinical trials, while also continuing to improve the basic knowledge about predicting, preventing, and treating a disease.

“The institute is not a clinic; it’s not a building,” explained Robert Mennel, MD, medical director of Baylor Precision Medicine Institute and an oncologist on the medical staff at BUMC. “It’s a collaboration of physicians focused on helping physicians and patients by gathering the most current scientific information and treatment options specific to the patient’s disease and genome.”

The process begins when a patient or physician contacts the institute’s patient navigator, who acts as the patient’s liaison and provides personalized guidance. Then the team at Baylor Precision Medicine Institute reviews the patient’s case and identifies a specialty physician on the medical staff at BUMC to guide the patient through advanced diagnostic and therapeutic options. Each course of treatment is designed for that patient’s specific needs. A wide range of options is considered, taking into account results of the latest research and input from the institute’s panel of specialists. “We
**RECENT GRANTS**

- **Mechanisms of B cell responses in autoimmune disease: P09-BRI**
  - Principal investigator: Hideki Ueno, MD, PhD
  - Sponsor: Duke University/National Institutes of Health
  - Funding: $117,600
  - Award period: 5/1/2013–1/31/2014

- **Mechanisms of B cell responses in autoimmune disease: M12-ALEOS-BRI**
  - Principal investigator: Virginia Pascual, MD
  - Sponsor: Duke University/National Institutes of Health
  - Funding: $334,737
  - Award period: 5/1/2013–4/30/2014

- **MIRA-cellular therapy for cancer**
  - Principal investigator: A. Karolina Palucka, MD
  - Sponsor: Cancer Prevention & Research Institute of Texas/Baylor College of Medicine
  - Funding: $105,690 for GMP core; $6,247 for administrative core; $47,692 for clinical core
  - Award period: 7/1/2013–6/30/2014

- **T follicular helper response in distinct vaccines**
  - Principal investigator: Hideki Ueno, MD, PhD
  - Sponsor: Mayo Clinic/National Institutes of Health
  - Funding: $216,404
  - Award period: 7/1/2013–6/30/2014

- **Role of mucosal dendritic cell subsets in the control of influenza A virus immunity**
  - Principal investigator: A. Karolina Palucka, MD
  - Sponsor: Mount Sinai School of Medicine/National Institutes of Health
  - Funding: $74,000
  - Award period: 7/15/2013–6/30/2014

- **The High Value Healthcare Collaborative: engaging patients to meet the triple aim**
  - Principal investigator: Andrew Masica, MD
  - Sponsor: Dartmouth College/Department of Health and Human Services/Centers for Medicare and Medicaid Services
  - Funding: $374,872 for patient engagement; $61,470 for sepsis improvement
  - Award period: 7/1/2013–6/30/2014

- **Proteogenomics for organ transplantation: prediction, diagnosis, intervention**
  - Principal investigator: Sumeet Asrani, MD
  - Sponsor: Northwestern University/National Institutes of Health
  - Funding: $62,505
  - Award period: 9/1/2013–8/31/2014

- **Costs of transforming established primary care practices to patient-centered medical homes**
  - Principal investigator: Neil S. Fleming, PhD
  - Sponsor: Agency for Healthcare Research and Quality
  - Funding: $99,821
  - Award period: 9/30/2013–3/31/2015

- **Baylor core clinical center for the Cardiothoracic Surgical Network**
  - Principal investigator: Michael Mack, MD
  - Sponsor: National Institutes of Health Funding: $372,486
  - Award period: 8/1/2013–1/31/2014

- **North Texas traumatic brain injury model system**
  - Principal investigator: Shahid Shafi, MD
  - Sponsor: US Department of Education
  - Funding: $447,500
  - Award period: 10/1/2013–9/30/2014

- **Maintenance of intestinal epithelial cell homeostasis by prohibitin**
  - Principal investigator: Arianne Theiss, MD
  - Sponsor: National Institutes of Health
  - Funding: $78,400
  - Award period: 9/18/2013–5/31/2014

- **Baylor, Touchstone Imaging form joint venture partnership**

A joint venture partnership between BHCS and Touchstone Imaging became effective on July 2, 2013. The new partnership provides patients with more access points for outpatient imaging with lower costs, while continuing to provide safe, quality, compassionate health care. While exact pricing depends on many variables, the average rate for CTs and MRIs has dropped by approximately 30% to 50% depending on insurance, when compared to the previous hospital rates. Further, patients benefit from having only one copay, as now the physician and facility rate is combined. Touchstone is a member of the Baylor Quality Alliance. The imaging centers include Advanced Imaging Center; Baylor All Saints Outpatient Diagnostic Center; Baylor Charles A. Sammons Cancer Center, outpatient MRI; Baylor Diagnostic Imaging Center at Craig Ranch, Grand Prairie, Grapevine, Keller, Lewisville, The Colony, Junius, Mesquite, and North Dallas; Imaging and Diagnostic Center at

have an expert panel of about 20 physicians on the Baylor medical staff who know physicians around the country—in fact, around the world—and are ready to informally add their expertise to the equation,” Dr. Mennel said. That’s one of the institute’s main advantages.

**Baylor’s innovative electronic health record design gets “thumbs up” from physicians**

Five years ago, Baylor Information Systems (BIS) technical manager Andy Pitts had a direct and insightful discussion with a physician critic. The meeting led to a strong “developmental” relationship between Baylor clinicians and the information technology group. In May 2013, BIS received special recognition for an innovative electronic design that has influenced thousands of Baylor-affiliated physicians to adopt and use computerized physician order entry (CPOE) and electronic physician documentation. Physician activity went from almost nothing to virtually 100% adoption in the span of a year.

BHCS solved the CPOE and physician documentation challenges with custom-developed components that integrate seamlessly into the Allscripts Sunrise product. For instance:

- Physician preferences on enterprise order sets: Allows physicians to spend more time with patients and less time entering orders.
- Slick text and plug-in approach: Allows physicians to control their own note templates and quickly create notes that match their unique needs, supporting customization while retaining the overall structure of an enterprise template.
- Electronic NoteBuilder bulletin board: Provides a convenient way for physicians to share their templates with colleagues, who can then customize the template to their own use without waiting on BIS resources.

In the hospitals that have used CPOE more than 5 months, more than 60% of the orders are now being entered by physicians. In April 2013, physicians placed 252,937 orders and documented 94,682 notes.
what happens to patients after a traumatic disorder, and alcohol abuse. 

Institute, is studying trauma patients’ postinjury psychological recovery, with a focus on identifying which patients are at risk for certain conditions, such as depression, posttraumatic stress disorder, and alcohol abuse.

“There isn’t a lot of research going on about what happens to patients after a traumatic injury and after they leave the hospital,” Dr. Warren said. “A lot of trauma patients get injuries, recover physically, and that’s all we know. We wanted to take that one step further and really analyze how a patient recovers mentally and physically after an injury.”

Supported by a $287,000 grant from Baylor’s Helen Buchanan and Stanley Joseph Seeger Endowment Funds, the project opened enrollment in March 2012 and has a participant pool of 375 patients. More than 85% of the eligible patients who were approached agreed to participate. The researchers study the patients over 12 months, with checkpoints during hospital admission and at 3, 6, and 12 months. As the team understands the various issues that affect a trauma patient’s mental health, they also analyze the predictive indicators that trigger trauma-induced psychological issues. Through the data, Dr. Warren and her team are finding that trauma patients have varying degrees of risk, but some factors—such as gender or even the type of trauma injury sustained—can affect patients’ postcare psychology.

UPCOMING CME PROGRAMS

The A. Webb Roberts Center for Continuing Education of Baylor Health Care System is offering the following programs:

- **North Texas Multidisciplinary Lung Cancer Symposium**, March 1, 2014, at BUMC
- **17th Annual Tyler Breast Cancer Conference**, March 21–22, 2014, in Tyler, Texas
- **Urology Update**, March 28, 2014, at BUMC
- **Cardiac Innovations**, May 8, 2014, at The Heart Hospital Baylor Plano
- **Fifth Annual Latest Advances in Ischemic and Hemorrhagic Stroke Therapy**, May 17, 2014, at Westin Galleria Dallas

For more information, call 214.820.2317 or visit www.cmebaylor.org.

PHILANTHROPY NOTES

Celebrating Women raises nearly $2 million to benefit Baylor’s fight against breast cancer

BHCS Foundation hosted its 14th annual Celebrating Women luncheon on October 23, 2013, at the Hilton Anatole Hotel in Dallas. For the ninth consecutive year, Tom Thumb was the Presenting Sponsor.

Over the past 14 years, Celebrating Women has raised more than $20 million, including nearly $2 million raised at this year’s luncheon, to benefit BHCS’s fight against breast cancer. During the luncheon, Rowland K. Robinson, Foundation president, announced that $600,000 raised through Celebrating Women would be awarded in support of Baylor’s genetic counseling program. These funds will expand the number of genetic counselors and genetic data specialists at Baylor, empowering hundreds of women with leading-edge diagnostic information to assist in the evaluation of appropriate treatment options.

Building on decades of innovative care and research, Baylor is dedicated to making strides in the fight against breast cancer through an ongoing commitment to patient care, education, research, and clinical trials. Joyce O’Shaughnessy, MD, the Celebrating Women Endowed Chair in Breast Cancer Research at Baylor, and Karolina Palucka, MD, PhD, a researcher in the Baylor Institute for Immunology Research, are currently awaiting regulatory approval to proceed with a pilot clinical trial that will test the efficacy of a vaccine on triple-negative breast cancer, an aggressive form of the disease. Circle of Care awardee Bruce Selkirk, in conjunction with the Foundation, has generated more than $1 million to support the research of Dr. O’Shaughnessy and Dr. Palucka.

Grand Rounds tees off, raising more than $300,000 for medical education

The 12th annual BHCS Foundation Grand Rounds® Golf Tournament, presented for the fifth consecutive year by Bank of Texas, teed off on October 7, 2013, at Northwood Club. The event raised more than $300,000 to support undergraduate and graduate medical education at BUMC. More than 200 golfers, representing over 50 companies, participated in the event. Platinum sponsors included Crothall Healthcare, Duke Realty, General Data Tech, Kaufman Hall, The David B. Miller Family Foundation, and Wells Fargo Bank. The gold sponsor this year was Aon Risk Solutions/Aon Hewitt.

Following a weather-perfect day for golf, players enjoyed a reception with guest speaker D. A. Weibring, a professional golfer for more than 35 years. During the event, D. A. spoke fondly of his friend, mentor, and business partner, Byron Nelson. He credited Byron with helping shape not only his swing, but also his character.

BUMC trains nearly 220 residents and fellows in 30 specialty and subspecialty programs. With donor support, BHCS Foundation plans to fund 30 residents and fellows at a cost of more than $2.2 million this fiscal year.

For information on how you can support these or other initiatives at Baylor, please contact the Foundation at 214.820.3136.
of this project are wide reaching. In addition to improving the standard of care for trauma patients, the research has a significant potential impact on hospital readmissions and health care costs, as well as patients’ return to work.

- **New book highlights Baylor’s quality journey**

  Reaching America’s true potential to deliver and receive exceptional health care will require not only an immense and concerted effort, but a fundamental change of perspective from medical providers, government officials, industry leaders, and patients alike. Achieving STEEEP Health Care, a new book published by CRC Press, highlights BHCS’s efforts to improve health care quality along the six aims of health care improvement outlined by the Institute of Medicine and embraced by Baylor leadership: safety, timeliness, effectiveness, efficiency, equity, and patient centeredness (STEEP).

  Achieving STEEEP Health Care offers practical strategies and lessons for other organizations in the areas of people, culture, and processes that have contributed to dramatic improvements in patient and operational outcomes at Baylor. “We hope that sharing the challenges and successes we have encountered in our STEEEP care journey will educate and encourage other health care delivery organizations embarking on their own quality improvement endeavors,” said David J. Ballard, MD, PhD, BHCS senior vice president and chief quality officer, president of the STEEEP Global Institute, and the book’s editor.

  The book’s associate editors include Joel Allison, chief executive officer of Baylor Scott & White Health; Rosemary Luquire, PhD, RN, chief nursing officer for BHCS; Paul Convery, MD, senior consultant for the STEEEP Global Institute and former chief medical officer; and Neil Fleming, PhD, vice president and chief operating officer of the STEEEP Global Institute. More than 40 leaders from Baylor and Scott & White Health contributed chapters on topics ranging from corporate governance and finance to physician and nurse leadership and successful service-line quality improvement initiatives such as reducing heart failure readmissions and coordinating comprehensive cancer care.

  Achieving STEEEP Health Care has already received high praise from health care leaders around the country, including Brent James, MD, chief quality officer and executive director of the Institute for Health Care Delivery Research at Utah’s Intermountain Healthcare, who commented that “those seeking to move to the safety of the high ground in an increasingly difficult health care delivery world will find [the book] valuable beyond compare.”

- **Book documents “110 Years of Surgery” at BUMC**

  Drawing on his 25 years as the 12th chief of surgery at BUMC and extensive research into Baylor’s history, Ronald Jones, MD, has written a book documenting the 110-year history of Baylor physicians. From pioneer doctors working in a 14-room renovated house in 1903 to modern robot-assisted surgical techniques, the scope of change the book covers is remarkably.

  The book includes Dr. Jones’ recollection of the day President John F. Kennedy was brought to Parkland Memorial Hospital after being shot by Lee Harvey Oswald at Dealey Plaza. Jones was chief resident at Parkland and examined the president before he was pronounced dead. He was also present at the surgical table where Oswald died of cardiac arrest after being shot by Jack Ruby.

- **BUMC receives Consumer Choice Award for 18th time**

  BUMC has received the 2013/2014 Consumer Choice Award from the National Research Corporation (NRC). It is the 18th consecutive time that BUMC has received the honor for the Dallas market. According to NRC Market Insights data, the country’s largest consumer survey on health care, consumers ranked BUMC at the top of the list based on four key categories: best overall quality, best image/reputation, best doctors, and best nurses.

- **Ten BHCS hospitals named “top performers”**

  Ten BHCS hospitals have been recognized as “top performers” on Key Quality Measures by The Joint Commission. The Key Quality Measures program is based on data reported in the previous year for heart attack, heart failure, pneumonia, surgical care, children’s asthma, inpatient psychiatric services, stroke, venous thromboembolism, and immunization. Ten Baylor hospitals were named top performers: Baylor Orthopedic and Spine Hospital at Arlington; Baylor Medical Center at Carrollton; Baylor Jack and Jane Hamilton Heart and Vascular Hospital; Baylor Medical Center at Uptown; Baylor University Medical Center at Dallas; Baylor Surgical Hospital at Fort Worth; Baylor Medical Center at Garland; Baylor Regional Medical Center at Plano; The Heart Hospital Baylor Plano; and North Central Surgical Center.

- **Baylor Fort Worth named “best local medical center” 2 years in a row**

  Baylor All Saints Medical Center at Fort Worth has been named the “Best Local Medical Center” by readers of the Fort Worth Star-Telegram for the second year in a row. The Star-Telegram Reader’s Choice Awards are voted on annually by readers and recognize organizations in various categories including health care. “This recognition affirms Baylor All Saints’ commitment and service to the Fort Worth community,” said David Klein, MD, president at Baylor Fort Worth. Dr. Klein added: “The high level of service and care that our staff provides does not go unrecognized by our patients and their families.”

- **Baylor Grapevine earns state’s first full atrial fibrillation certification and other cardiovascular awards**

  In September, Baylor Regional Medical Center at Grapevine learned that it was the first Texas hospital to earn full Atrial Fibrillation Certification status. The 3-year certification is awarded by the Society of Cardiovascular Patient Care. “We are pleased to be recognized as the first hospital in Texas to receive this important certification,” said Steve Newton, West Region president of BHCS. “We remain committed to offering quality heart and stroke programs that provide the community with advanced treatment options for atrial fibrillation.”

  Baylor Grapevine also received two national awards: the Get with the Guidelines—Heart Failure Gold Quality Achievement Award from the American Heart Association/American College of Cardiology and the Get with the Guidelines—Stroke Gold Plus Quality Achievement Award from the American Heart Association/American Stroke Association. In addition, Baylor Grapevine was listed in the American Stroke Association’s Target: Stroke Honor Roll for improving stroke care.

- **BUMC nurses join elite group of three-time Magnet-recognized hospitals**

  Only 1% of all hospitals with Magnet status are members of the elite group that has earned the designation for three consecutive 4-year periods. Now BUMC joins the handful of other hospitals nationwide that have earned this singular achievement, according to the American Nurses Credentialing Center. Magnet
status is the highest level of formal recognition for nursing excellence and is considered the gold standard for hospitals. Only about 7% of 6000 eligible hospitals nationwide are Magnet facilities.

Press Ganey announces 2013 award winners

Two BHCS hospitals and a HealthTexas Provider Network group are Press Ganey 2013 Beacon of Excellence Award winners. Baylor Jack and Jane Hamilton Heart and Vascular Hospital and The Heart Hospital Baylor Plano are Beacon of Excellence Award winners for inpatient satisfaction. The Heart Hospital Baylor Plano also received a Beacon Award for emergency department satisfaction. This year, HealthTexas Provider Network—Signature Medicine also received the Beacon Award. The Beacon of Excellence Award, formerly the Summit Award, is one of Press Ganey’s most prestigious awards, honoring health care organizations that sustain an overall patient satisfaction rank above the 95th percentile for at least the past three consecutive years. This award is given to the top three performing organizations by category on the basis of extraordinary achievement. Only 100 organizations receive the award in each category.

Seven Baylor entities received Press Ganey’s Guardian of Excellence Awards. This award honors health care organizations that have reached the 95th percentile for patient satisfaction, employee engagement, or physician engagement surveys or clinical quality performance and is awarded annually based on 1 year of data. Guardian of Excellence Award winners include Baylor Heart and Vascular, inpatient; The Heart Hospital at Baylor Plano, emergency department and inpatient; four United Surgical Partners International—Baylor-affiliated medical centers; Baylor Medical Center at Uptown; Baylor Surgical Hospital Fort Worth, emergency department; Baylor Medical Center at Frisco, inpatient; Irving Coppell Surgical Hospital, emergency department and inpatient; and Emerus Emergency Facility, Aubrey, Texas.

BaylorHealth.com receives top health care marketing award

BaylorHealth.com earned Platinum status for Best Overall Internet Site—the highest award in this category—from eHealthcare Leadership Awards. The website shared the platinum honors with Cleveland Clinic. Baylor’s site was one of 1,100 entries received from a wide range of health care organizations, including Mayo Clinic, MD Anderson, Brigham and Women’s, UCLA Health, and Baptist Health. BaylorHealth.com was also recognized at the Healthcare Internet Conference for “Best Use of Health Content in Digital Marketing.” BaylorHealth.com received the Gold Award, the highest honor given, for best in class in this category.

ACCOLADES

Gary Brock, who has served as chief operating officer of BHCS, has taken on a new role as president of BHCS. In 2014, he also began a term as president of the Texas Hospital Association board of trustees. Becker’s Hospital Review, one of the nation’s leading health care business publications, has named Joel Allison, CEO of Baylor Scott & White Health, in its list of “130 Nonprofit Hospital and Health System CEOs to Know” and Nancy Vish, RN, PhD, president and chief nursing officer of Baylor Jack and Jane Hamilton Heart and Vascular Hospital, in its list of “130 Women Hospital and Health System Leaders to Know” for 2013.

Fred Savelsbergh, Baylor chief financial officer, was recognized by the Dallas Business Journal with the CFO Lifetime Achievement Award.
Tributes to Marvin J. Stone, MD, on his retirement

Marvin J. Stone, MD, founded the Baylor Charles A. Sammons Cancer Center in 1976 and directed it for more than 30 years. When he retired in July 2013, a reception was held in his honor (Figure 1), and a sample of tributes given at the event and submitted afterwards are reprinted below. An interview of Dr. Stone was published in Proceedings in 2001 (1).

MICHAEL EMMETT, MD

When William Osler was preparing to go to Oxford in 1905 he gave a famous farewell speech to his colleagues at Johns Hopkins and said, “I desire no other epitaph . . . than the statement that I taught medical students in the wards, as I regard this as by far the most useful and important work I have been called upon to do.” There is no doubt that Marvin Stone, who regards Sir William as one of the greatest physician-philosophers in history, agrees completely with this statement. Marvin has had a wonderful and remarkable career as a physician, scientist, and medical administrator, but I am certain he regards his role as a teacher to be the high point of his long and distinguished career.

Still, on the occasion of Marvin’s semiretirement, I must mention some of the bricks and mortar monuments to his legacy at Baylor University Medical Center at Dallas (BUMC). For his entire career at BUMC, he led the oncology and hematology programs. For most of that time they were “housed” in a cancer center of oncology and hematology excellence that had no physical walls. This virtual structure was held together by the strength of Marvin’s academic excellence and the universal respect accorded him by his local colleagues, an increasing number of former students as well as leaders and experts throughout the world. The interaction of oncologists, hematologists, surgeons, radiologists, radiation oncologists, pathologists, nurses, technicians, and others provided thousands of patients with expert care, extended the lives of untold numbers of individuals, and always provided that care with heartfelt compassion and sensitivity. A definitive building was not required. Nonetheless, over the past few years the Sammons Cancer Center and the T. Boone Pickens Cancer Hospital have been completed and stand as wonderful physical testimonials to Marvin Stone’s legacy.

However, I must return to Marvin the teacher. Whether in the classroom giving a formal lecture on the latest developments in an area of hematology or oncology, always rooted in medical history, at the microscope during one of his famous “what does the blood smear show?” sessions, or at the bedside where he expertly blended the science of medicine with the humanism required of the true physician, Marvin has been a master (and indeed he is a Master of the American College of Physicians). The legions of medical students, residents, fellows, and faculty that he taught so well by example carry his lessons forward. When Osler gave the speech I mentioned above, he was 55 years old. In the same speech, he proposed that scientists
and academicians do their best work before the age of 40 and should probably retire at the age of 60. However, no one, not even Osler, is infallible, and exceptions always exist. I personally know so many who continue to be very productive beyond those ages, and a brilliant exception is Marvin Stone. We hope that he defies Osler’s prediction for many years to come as he continues to lecture and “teach medical students on the wards” even in his semirement.

JOHN S. FORDTRAN, MD

When Marvin Stone was a resident at Barnes Hospital in the early 1960s, he made a critical decision: to become an academic physician. In those days, that meant he would have to do three things simultaneously: research, teach, and practice medicine. Here I will comment on how well Marvin was able to fulfill those three aspects of academic medicine and what his efforts did for Baylor.

First, on research, Marvin prepared himself by taking 3 years off between his second and third year of residency in order to do immunology research at the National Institutes of Health (NIH). This basic research experience yielded five main articles, two of which were published in Journal of Biochemistry. After his NIH research experience, he did 1 year of residency and 1 year of fellowship training at the University of Texas (UT) Southwestern Medical Center and then was on the internal medicine faculty at UT Southwestern for 6 years. During his time at the NIH and at UT Southwestern, he published 22 excellent papers.

No one expected Marvin to publish research after his move to Baylor in 1976. In fact, since coming to Baylor, Marvin has published 214 more papers, including research on many aspects of hematology and immunology—antitumor antibodies, Waldenström’s macroglobulinemia, monoclonal antibodies, graft-versus-host disease, multiple myeloma, amyloidosis, and transplantation. He has continued to do basic laboratory research via his collaboration with Alex Tong and Joe Newman, and he continued his research collaboration with basic scientists at the UT Southwestern Medical School, Jon Uhr and Ellen Vitetta.

Now let’s examine Marvin as a teacher of medical students and housestaff. Starting in 1988, Marvin was in charge of all UT Southwestern junior students when they rotated at Baylor. This ended only about 2 years ago when Southwestern stopped sending junior students to Baylor. Marvin then became the director of the medicine clerkship for junior medical students from Texas A&M while they are stationed at Baylor. For Texas A&M students in their fourth year, Marvin established a very popular elective in the humanities and also directed the oncology elective. Marvin attended every lecture the Texas A&M junior students received, 1 hour each day, to make sure that the lectures were good and on target. Personally, this made me a little tense—but I have to admit it made me prepare better.

In terms of medical residents, Marvin has received the award for best teacher on multiple occasions, with the first given to him in 1977 by Paul Neubach. Our housestaff’s opinion of Marvin as a teacher is best illustrated by a letter they wrote to Marvin in 1987, when he was offered the position of chair of the Department of Internal Medicine at Presbyterian Hospital.

We cannot help but greet this news with profoundly conflicting emotions. As a group, we associate Baylor and the Internal Medicine Department with you and your dedication to excellence in teaching and practice. Many of us, from our first days as third-year students, through our internship and residency years have been immeasurably enriched by your efforts as an educator. There is not one of us who can see a low hematocrit without instantly referring to a “Marvin Stone lecture” imprinted in our mind for guidance.

This letter was signed by every member of the housestaff, including John Pippen, who was a resident at that time.

What about Marvin as a practicing physician? Mary Ann Allison remembers being the resident in the corner of the examination room, watching him.

He would just sit there on his little stool, as if he had all the time in the world and the patient was the only thing that was important. He was the kind of doctor that you yourself wanted, not someone high-powered, rushing in and out, being loud and aggressive. He is a very caring and concerned person.

His patient, Bobby Fields, said this: “When he is seeing me, I feel like the only patient he has. He is calm; he doesn’t push the panic button. He has great knowledge and compassion.” I can personally testify that when you see Marvin as a patient, you will get a really complete physical exam, and he himself will look at your blood smear. Most of all, those I’ve talked to who see Marvin as a patient love him because they can easily perceive the enormous breadth and depth of his medical knowledge, which of course is the most essential element for clinical excellence.

I have to give Marvin some extra credit for his extracurricular activity. Examples include his contributions to the Osler Society, the American College of Physicians, medical ethics, Baylor histories, and as champion of the role of autopsy.

Most people can name a doctor who did more research, a doctor who is an outstanding teacher, or a practicing doctor who has excellent knowledge and judgment and practices the art of compassion—but it is difficult to name a doctor who does all three in balance like Marvin has done. To be a master of the entire spectrum is very rare and requires great dedication, hard work, discipline, and good organization. Marvin’s efforts have enriched Baylor internally and enhanced Baylor’s reputation. I think he deserves to be recognized as one of the most important and complete physicians who has ever worked at Baylor.

ROBERT G. MENNEL, MD

I originally met Marvin Stone in October of 1978. I was a very junior faculty member at Hopkins and Marvin was 2 years into what would be a 33-year tenure as the first head of the Sammons Cancer Center at Baylor University Medical Center.
I came to Baylor at the urging of a former oncology fellow whom I trained with, Leon Dragon. To be honest, I did not think that I would be interested in Baylor and Texas. My wife and I came as a favor to Leon, and we were in need of a trip and a little time away from our three children. A trip to Baylor fit the bill. There were a number of people that impressed me on my trip to BUMC, but Marvin was especially influential in changing my interest in Baylor from casual to definite. There were a number of qualities of Marvin that were immediately evident to me and appealed to me—honesty, reliability, humor, a true interest in other people, empathy for and care of his patients, scholarship, a love of medicine and especially the teaching of medicine. This early admiration has turned into a deep friendship. Years later, I realized that many of these qualities came from his admiration of William Osler. Osler’s life was not a casual interest of Marvin but a rule to live by. We often kidded him about Osler, but we all knew that he was dead serious about his admiration for Osler as a man and as a physician to be emulated.

In my early years with Marvin, I was impressed with how interested he was in the young members of the cancer center. He was interested in helping people reach their full potential. He gave the young as well as the older members their head and always tried to have everyone develop an interesting and rewarding career. If he had favorites, they were not obvious. He wanted to have everyone enjoy their work, and work well together to provide the best care for their patients, move the field of medicine ahead, and teach those coming up behind them in medicine.

Although medicine was in many ways Marvin’s life, it was not the only thing of his life. He loved the symphony and he loved collecting microscopes and books. Although one could argue that his collection of microscopes was just an extension of medicine, I think it was much more than that. To me, although Marvin was an excellent oncologist, his real love was hematology. It was impossible for you to rotate with him and not understand that many of the mysteries of medicine could be demystified by microscopy, especially of the blood smear. I believe this is what led to his exhaustive collection of historic microscopes. His collection was so large that it is housed in three separate areas, the Sammons Cancer Center, the Baylor Institute for Immunology Research, and his home. Like Osler, Marvin loved books and he avidly collected them. He was especially interested in old medical books. It was a great honor to be gifted a book by Marvin from his collection.

Another very evident quality of Marvin is his humanism. This applied to his approach to medicine, but also to every aspect of his life. To Marvin, a patient was first and foremost a person. He believed that the humanistic practice of medicine was equally as important as the scientific practice of medicine. He believed that the patient had to be treated as you would treat a friend, not a subject. He taught many physicians, faculty included, the value of talking to the patient and examining the patient and the folly of relying on impersonal labs and images alone. In his career, he cared for many physicians and their families—a true testament to the trust that medically savvy people placed in him. He was a doctor’s doctor.

I have not done justice to Marvin with this very brief description of what he means to me. This testimonial is much too short to do him justice. Suffice it to say that Baylor was fortunate to have selected Marvin as its first director of the Sammons Cancer Center. He had the true interest of Baylor’s cancer center at heart and led the cancer center through its formative years to become an outstanding center. He surrounded himself with an interesting and talented group of faculty. He personally furthered the careers of countless staff and faculty. He lovingly educated numerous medical students, medicine residents, and oncology fellows. Most importantly he is a genuine and nice person who is worthy of your trust. I have learned a lot about medicine and life from Marvin. I am sorry to see him retire. I am especially sorry not to have him in the office next to me, where I can just drop in to seek his sage advice. He is more than a colleague to me. He is a true friend.

ALAN M. MILLER, MD, PHD

In the 1991 Cancer Center Annual Report, Dr. Marvin Stone wrote:

Three simple words summarize our mission and goals at the Baylor Charles A. Sammons Cancer Center: help, hope, and healing. We share these concepts with each of the more than 2000 new patients we serve each year through a combination of sophisticated equipment and technology and straight-from-the-heart compassion. This synthesis of “high-tech and high-touch” forms the nucleus upon which the Sammons Cancer Center was built and continues to grow.

Aside from the patient number, all of these words are applicable and accurate today. The foundation that was established in 1976 and the years to follow is what our cancer center with its all of its clinical, research, and education programs is built on today. Dr. Stone’s career in medicine has seen dramatic and exciting changes in the way we treat cancers and blood disorders.

They say if you can’t be born a Texan, get here as soon as possible and you will never leave. Well, it took Dr. Stone a while to get here, but he travelled through some of the most prestigious institutions along the way: the Ohio State University for undergraduate; the University of Chicago for medical school; Barnes Hospital in St. Louis for internship and residency; the National Institutes of Health in Bethesda for a research fellowship, where he began his work on Waldenstrom’s macroglobulinemia; and then finally to Texas.

He first came to Dallas in 1968 to be a senior resident in medicine at Parkland. It is fun to speculate whether his career was influenced by the lead article in Blood on January 1 of that year: “Melphalan therapy for multiple myeloma” by Alexanian and colleagues. In 1976 he was lured across town to Baylor to become the first director of the cancer center and chief of oncology. At that time there were three attendings in medical
oncology; when I arrived in 2008 there were more than 10 times that many, and over 150 members of the Department of Oncology.

Dr. Stone’s accomplishments here at Baylor were amazing. He oversaw the building of the first Sammons Cancer Center, initiated the bone marrow transplant program, established the Cvetko Center, and got approval for a medical oncology fellowship program. He was among the visionaries that began the process that led to this magnificent building.

In an interview in 2001, Dr. Stone was asked, “Are there some goals that you would like to accomplish before you retire?” He answered, “I’d like to develop some new programs and expand others, for example, in cancer prevention, genetic counseling, and psychosocial support activities.” Well, you can check off all of those boxes.

Dr. Stone made it very easy for me when I came here in 2008. No one could ask for a predecessor who was more gracious and supportive. During these last 4½ years he has provided valuable wisdom, knowledge, and leadership.

The legacy that Marvin Stone has left will not be forgotten, but just so we have reminders every day about what a true scholar is, a portrait of Dr. Stone with his treasured microscopes and books will hang in the oncology classroom on the fifth floor, and in addition, the education suite on the fifth floor will be known as the Marvin J. Stone Medical Oncology Education Suite (Figure 2).

JOHN E. PIPPEN, MD

As I reflected on the years that Marvin Stone has been my friend and mentor, I tried to think of the things that make him a great teacher of medicine. One of the most important of these is a sense of humor. On the first day of my fellowship, I sat across the desk from him, unable to hide the nervousness of a first-year oncology fellow. He asked me what my learning goals were for the next 2 years. After I recited a few of the typical answers to this question, he told me he would like for me to have one major goal. He said that by the end of my fellowship, it would be his hope that I would be able to use 15% of my brain. With the ice thus broken, I was off and running on what I remember as a very rich 2-year learning period in my career. I am happy to report that I am now at 20%.

A good teacher in medicine is one that can teach students at all levels. This includes possessing the ability to teach those that think they already know it all. Over the last 20 years, there have been a number of us that spent some time practicing internal medicine before returning for a fellowship in medical oncology. This can be a tough crowd when it comes to successful teaching. All of us on this career path agree that Dr. Stone provided the right mix of encouragement and cajoling to send all of us back to practice with the background to be successful medical oncologists. One Tuesday afternoon during his weekly microscope teaching rounds, I looked around the door to see who was there. At the scope were fellows, a medical resident, a medical student, and my 14-year-old son Charlie. He had heard about the microscope rounds and wanted to listen in. That night, Charlie made the correct observation that polychromasia is pretty easy to spot if you just remember to look for it. Dr. Stone would have been smiling if he had heard this statement from my eighth grader.

One recent day I picked up my copy of Aequanimitas. A copy of this great book by Sir William Osler was presented to me by Dr. Stone in 2002. I looked up Osler’s comments on teacher and student. What did Osler say makes a great teacher? He wrote:

First, enthusiasm, that deep love of a subject, that desire to teach and extend it without which all instruction becomes cold and lifeless; secondly, a full personal knowledge of the branch taught; not a second-hand information derived from books, but the living experience derived from experimental and practical work in the best laboratories. . . . Thirdly, [teachers] are required who have a sense of obligation, that feeling which impels a teacher to be also a contributor.

It is a rare teacher of medicine who has a sense of humor, an ability to teach at all levels, enthusiasm, full personal knowledge of the branch taught, and a sense of obligation. I and many others have benefitted from Dr. Stone’s great teaching over many years. It is with great respect that I again say thank you to someone who has made such a difference in my personal and professional life.

WILLIAM L. SUTKER, MD

My first exposure to Dr. Marvin Stone was when I was a Baylor internal medicine intern in 1974. We used to watch Parkland grand rounds on TV from the BUMC medicine library. Dr. Stone was giving a lecture about amyloid and talked about how many angstroms there were between the pleats in the amyloid sheet. I thought: “Are you kidding? Who is that guy and how is any of that relevant to practicing medicine?” My first face-to-face encounter was when I was a medicine resident and he came to BUMC from Southwestern in 1976. I met him in the clinic and thought: “This guy
is pretty smart and he is a nice guy.” That was a day I will always remember but I am sure he has forgotten. Since that time he has been an important part of my professional life. He has been my teacher, my mentor, and my friend. He has been a role model for me and many other young physicians through the years.

Our relationship continued to flourish over the last 35 years. We have had some interesting discussions. He helped me with a paper I wrote as an infectious diseases fellow about bone marrow granulomas. It was never accepted for publication and he has one of the two surviving copies of the paper. He used to quote it to others as if it were a landmark study. I would always go to him after I would give a grand rounds for a critique of the talk. His opinion was important to me. We had debates about whether or not giving steroids could cause a leukocytosis with a left shift. We debated whether cancer, in the absence of infection, could cause fever. I sat at a microscope with him for hours trying to convince him I had a patient with babesiosis. I constantly reminded him about my opinion that much of oncology was really an infectious disease and that he might have to come back and train with me.

I always felt comfortable talking to Dr. Stone. I went to him frequently for professional and personal advice. I valued his counsel and opinions. Others have written about his enormous contributions to medicine and especially to oncology at Baylor. He has won numerous awards and accolades. But he has always been very humble and never talked about himself. His accomplishments did the talking for him. His shoes will be tough to fill.

I am proud that I can say that Marvin Stone had a very positive influence on the careers of many physicians, including me. But I am most happy that he is my friend.

Sabrina Phillips was born in Tulsa, Oklahoma, on September 3, 1968, and grew up in Cleveland, Oklahoma. Both she and her older brother were adopted by loving parents who created a warm and enriching home. From early on, Sabrina was curious about how things worked. She won a full scholarship to Oklahoma State University and studied electrical engineering. After marrying her sophomore year, she transferred to Wichita State University where her husband, also an engineer, was employed. She graduated summa cum laude with a bachelor’s in engineering from Wichita State University in 1990. After working for 3 years in Dallas at Texas Instruments, she enrolled at The University of Texas (UT) Southwestern Medical School in 1993 and graduated first in her class of 210 students in 1997. Her training in internal medicine and cardiology was at Baylor University Medical Center at Dallas (BUMC), and after completion of the cardiology fellowship in 2003, she did a year-long fellowship at the Mayo Clinic in adult congenital heart disease. In 2004, she returned to Dallas as a member of the cardiology staff of BUMC. Within a year she was offered a staff position at the Mayo Clinic in the Division of Cardiovascular Disease, specializing in adult congenital heart disease. Since returning to the Mayo Clinic, she has become an international leader in the field of adult congenital heart disease. She has published 31 articles in peer-reviewed medical journals and 8 chapters in various books focusing on congenital heart disease in adults. Since 2002, she has given over 120 talks at various meetings around the world. She has received two outstanding teacher or educator awards at the Mayo Clinic. We here at BUMC are very proud of Sabrina’s success in light of her 6 years of postgraduate training at this institution. Sabrina and her husband, Nathan, are the proud parents of two daughters. Sabrina is an absolute straight shooter and a pleasure to be around.

William Clifford Roberts, MD (hereafter, Roberts): Sabrina, thanks for revisiting Baylor Dallas. We have missed your presence greatly. Your presentation earlier today at medicine grand rounds was wonderful. Could you talk about your upbringing and what your childhood was like?

Sabrina Dean Phillips, MD (hereafter, Phillips): I was born in a small town outside of Tulsa, Oklahoma, and was raised in Cleveland, Oklahoma. My mom was a secretary for an oil company and my dad was a lineman for the rural electric cooperative, the local power company. I have one older brother. We had a blue-collar upbringing in a small community. Our upbringing was a Norman Rockwell type, with a good solid community and a wonderful school experience in which I got involved in many activities.

Roberts: Were you involved in any activities?

Phillips: I played some basketball and softball early on. By the time I got to high school I much preferred being a cheerleader, being on the student council, or other activities that involved the school.

Roberts: Did you work during summertime or after school?

Phillips: Yes. During the school year my mom did not want my brother or me to work. She thought our job was to go to school and learn. I agree with her. I did clean houses one summer. I worked at the rural electric cooperative one summer filing papers. I occasionally helped the florist in town deliver flowers during busy special days.

Roberts: How big was Cleveland, Oklahoma?

Phillips: About 2000 people. The high school was relatively big for that size of a town because there were only three high schools in the county and we pulled in a lot of rural-area students. There were 100 students in my high school class. My husband grew up in a town just 10 miles away and had 32 students in his graduating class.

Roberts: What was your home life like? Did you all have dinner together?

Phillips: Yes. That was expected. Ours was a very traditional family environment. Mom was in charge of the household. When I was older she worked outside of the home as a secretary, but when I was young she was entirely a homemaker. She was a very strong woman. My dad worked very hard during the days but at night he was a family man.

Roberts: What did you talk about at the dinner table?

Phillips: I don’t remember much about that. We didn’t have a television for many years, not until I was in elementary school. We did a lot of outdoor play activities.
Roberts: Was there much encouragement for you and your brother to do well in school, or did that just come naturally?

Phillips: My mom wanted us to do well but she was certainly not a “tiger mom.” I don’t remember her having to tell me to do my homework. I just did it.

Roberts: When did you realize you were smart?

Phillips: That’s an interesting question because there was a moment. In fourth grade in our science classroom, the teacher did an experiment in which she made a vacuum in a canister which then crumpled from the air pressure. She asked why that happened. I knew immediately why it happened. I wanted to learn how the world worked.

Roberts: Did you have hobbies?

Phillips: I did a lot of reading.

Roberts: What did you like to read?

Phillips: Anything and everything, mainly fiction, but I wasn’t into science fiction.

Roberts: Did you read fast, several books a week?

Phillips: Yes. My mom was a big encourager of reading. Even when we were little she was either reading to us or giving us things to read. My mom saved Green Stamps and with them got a set of Collier Encyclopedias. My brother read all of them, starting with Volume A. Initially, I had no interest in doing that, but I liked reading and learning about different worlds.

Roberts: Did you travel in your imagination?

Phillips: Yes. Even though they had limited means, my parents considered vacations to be very important. Every year my dad would take a week of vacation. It was an event. We planned this time for weeks in advance. My brother and I were involved. We got a map and studied where we would drive, what we would see, and where we would stay. It was the greatest thing. We have albums and albums of our travels in the US in an old Chevrolet (Figure 1).

Roberts: Where do you remember going?

Phillips: My mom once wanted to go to the Blue Ridge Parkway area in the Appalachian Mountains. I don’t remember which state we were in, but I do remember camping out and getting rained on.

Roberts: Did you camp out most trips?

Phillips: That was the only trip we camped out. It rained and that changed our minds forever about camping. My mom burned the tent. After that we stayed at a Motel 6 or Holiday Inn. I always hoped for a pool at the hotel.

Roberts: Was your home a happy one? Lots of laughter and not much arguing?

Phillips: It was a very happy home. My parents are still married after 58 years (Figure 2). We had a great home life, and I have a great relationship with my brother. One interesting story: When we finally got a television, the TV show we liked in the 1970s was “Emergency.” It followed two paramedics in Los Angeles, CA. It also included their experiences in a hospital setting that involved a couple of doctors and nurses at Rampart Memorial Hospital. My brother and I loved the show. We just had to watch it. I really liked when the show transitioned back to the hospital. My brother liked it when the paramedics were out doing the rescues. He is now a paramedic and a fireman! When he graduated from the fire academy, I sent him a card saying, “I knew Mom let us watch way too much ‘Emergency.’” Because of this show we made our own defibrillator. Many of my dolls got defibrillated. We used an old diaper bag as our emergency medical bag and reenacted the scenes of “Emergency.”

Roberts: When you were young, were you interested in medicine or becoming a physician?

Phillips: My mom was very curious about medical issues, and her interest probably prompted my medical curiosity. Neither parent
had a college education. My mom was the one in our family who could drive the car. Neither my grandmothers nor paternal aunts drove—something not uncommon in that era—so my mother became the de facto driver for medical appointments. There wasn't much medical care in our little town, so if a specialist was needed a drive to Tulsa about 1 hour away was necessary. Mom, as the driver and the medical translator for our family, became the central person who took care of the grandparents and the elder aunts. As a small child I went along. I can remember thinking at one point, while sitting in a doctor's waiting room, what was going on behind the door. Because of such experiences, I recognized how important the doctor visit can be in a patient's life. For the physician, a single patient is just one of several that day, but for the individual patient seeing the doctor was a major event. The family may have waited many days or weeks for the appointment, and getting to the appointment might have been quite an undertaking. Witnessing those visits set the foundation for my medical curiosity.

Although I developed a strong respect for the medical profession, I really didn't think about becoming a physician. I'd never seen a female physician locally. Our small town doctor was a man. When I got ready to go to college, I was still very curious about how things worked. I decided to study engineering. I really enjoyed engineering and got a bachelor's of science and practiced engineering for 3 years.

**Phillips:** Where did you go to college?

**Roberts:** I went to college at Oklahoma State University on a full scholarship and then midway through I got married. My husband is a couple of years older than me, so he was graduating with his engineering degree and had gotten a job at Boeing Military Airplane in Wichita, Kansas. After much deliberation as to what this would mean to me, we moved to Kansas and I transferred to Wichita State University, where I had no scholarship. Thus, I went from a big state university to a much smaller state university. Like many things in life, there were unexpected opportunities and unique experiences. Wichita State University offered a much more intimate one-on-one interaction with the professors. I ended up having a fantastic experience there. After graduation, I was offered a position with Texas Instruments in Dallas as an integrated circuit designer.

**Roberts:** Your husband was working for Texas Instruments also?

**Phillips:** No, my husband was working for Forney Corporation, also in Dallas. They did control systems for large-scale power plants. He had a master's degree in control theory, which is a subset of engineering.

**Roberts:** When you graduated from engineering school, there weren't many female engineers?

**Phillips:** Correct, especially in electrical engineering.

**Roberts:** That's the hardest type of engineering?

**Phillips:** Chemical engineering is very difficult but electrical is a taxing program and there are very few women in the class. In the group I was hired into at Texas Instruments, I was the only woman. There were other female engineers in the company, but not in my group. Engineering is definitely a male-dominated field.

**Roberts:** You must have enjoyed mastering your initial career choice.

**Phillips:** I loved getting to figure out how things worked and loved math. That's almost a dichotomy when I think about what I do now, because one of the things I loved about math was it's a perfect universe. If you follow the rules you get to the right answer. Math is a perfect world of rule following and getting to a solution. I really liked that. Some of that is why I liked engineering—not only figuring out how things worked but that there was a set of physical rules to apply to get to a point. That's the interesting thing about medicine. Outcomes are stochastic. In medicine the rules can be followed and still the outcome can be bad. That's difficult for someone who has a background or ideology like mine. That's the difficult part of medicine to handle. I want to follow the rules and have good outcomes. That's not always the case. For one to love math so much, I have wondered how I ended up in the area I am in.

**Roberts:** It seems to me that engineering is brain only, whereas medicine is both brain and heart.

**Phillips:** Right. I love the contact with patients. The engineering world is very isolated, unitary, and I love the interaction with people. I'm kind of nosy too. I like to hear about what people do. I enjoy talking to my patients about their lives.

**Roberts:** How did it come about that you switched to medicine?

**Phillips:** I started my master's degree at Southern Methodist University, a program through Texas Instruments, where I could take the class on a video monitor on the TI campus. I did that for a year. At the same time I was trying to understand more about what I wanted to do. I think being independent and living in a new city provided opportunities to reevaluate things. While studying for a final, I had an epiphany: I didn't think electrical engineering was the path for me. I really wanted to study medicine.

**Roberts:** This was how long after you had started with Texas Instruments?

**Phillips:** About 2 years.

**Roberts:** Did you take the final?

**Phillips:** Yes. After taking the final I went to the advisor's office and told him that I had an engineering degree, had just finished a year towards a master's degree, but wanted to go to medical school. I asked, “How do I do that?” He told me what I would have to do to change course. I thanked him for the roadmap, went to the library, and picked up an MCAT book. I took the MCAT the next time it was offered, simultaneously taking a night class in organic chemistry at the community college. That worked because I had to work during the day. Then, I found a biochemistry class over the noon hour at the University of Dallas.

**Roberts:** You had not taken either of those classes in college?

**Phillips:** Many classes that I needed as prerequisites for medical school I obtained through my degree, but I did not have any organic chemistry or any higher-level biology. I had to complete those classes. My MCAT scores thankfully turned out to be pretty good.

**Roberts:** What were your MCAT scores?

**Phillips:** I don't remember, but the best was reading comprehension and the worst was organic chemistry; I was still taking the class when I took the MCAT.

**Roberts:** But you did extremely well on it?
Phillips: I did well on it. I applied that year to UT Southwestern Medical School. In my interview they asked if I was applying to only one medical school. I said yes. Because I had no background in medicine—no one in my family was a physician, and I didn’t know anyone who had trained to be a physician—it just didn’t strike me that applying to only one medical school might not be sufficient. I just laid out a plan and was accomplishing the plan.

Roberts: What year did you start at UT Southwestern?

Phillips: I was supposed to be in the class of 1992, but the week after I got my acceptance letter to UT Southwestern I realized that I wasn’t feeling well. I wasn’t sure what was wrong, but I did a test and found that I was pregnant, something unexpected. When I talked to the dean of student affairs at Southwestern, I told him that my baby was due in November 1992. I was supposed to start classes in August 1992. I asked him what he thought I should do. He suggested that I defer a year and start in August 1993, and that’s what I did.

Roberts: By that time you were 25 years old?

Phillips: Yes.

Roberts: Do you regret that you delayed a year before starting medical school?

Phillips: No, I think that was perfect advice. The delay gave me the first 10 months with Victoria, and that was good.

Roberts: How many classmates did you have in medical school, and how many of them had children while in medical school?

Phillips: I had 210 classmates, and two other female medical students began medical school with children. A few had pregnancies during our fourth year. There were not many women in my medical class—maybe 25%. Now, it’s about 50%.

Roberts: How did medical school strike you?

Phillips: I loved every moment. Because I wanted to do it and had already experienced something else, I don’t think there was any of that angst about it being hard or being unsure I was in the right place. Every day was exciting. I had a fantastic experience at UT Southwestern. I thought that it was the best medical school experience one could have.

Roberts: When you told your husband that you would like to go to medical school, what was his reaction?

Phillips: He was a little bit taken aback, but he knew that I wasn’t completely professionally satisfied in engineering and was still searching and trying to understand what I wanted to do. He was very supportive.

Roberts: How did you take care of your baby during medical school?

Phillips: My daughter was 10 months old by the time I started medical school. There was a day care on the north campus at UT Southwestern, so I would drop her off in the mornings and pick her up in the afternoon. The traditional medical school model was very helpful in that regard. There was classwork and homework, and as long as you attended class, you could decide when to do the homework. The first 2 years I was in classes and taking tests. The day care was excellent.

Roberts: When you were in medical school, did you have difficulty deciding which specialty you would go into, or was it easy for you?

Phillips: It wasn’t easy for me because I liked all the clinical rotations except psychiatry. I did surgery first; I wanted to be a surgeon. By the time I did a third-year rotation here at BUMC in medicine, I thought medicine was the place for me. By the end of that rotation, I knew I wanted to do something in internal medicine. I was heavily influenced by the hematology and oncology group at Baylor—Dr. Marvin Stone and Dr. Robert Mennel. I thought oncology was the area for me. That was my plan. When I began my fourth year of medical school, I knew that I was going to go for a medicine match, thinking that I would do oncology. But, I got pregnant again the first part of the fourth year. By January 1997, I was 7 months pregnant. All I had left to graduate were two electives, and I had to pick something out of surgery or pediatrics. I selected a surgical rotation but my advisor thought that surgery was the wrong choice since I was 7 months pregnant. He suggested that I find something else, but there wasn’t really anything else I liked. He indicated that there was an opening in pediatric cardiology. By that time, I didn’t like pediatrics and didn’t want to do it. He said the pediatric cardiologists were really good guys, that I could sit down in the clinic and not stand in the operating room in surgery. He thought that would be a good choice for me, so I agreed.

I embarked upon the rotation at Children’s Hospital and it was life changing. I realized that this specialty was really interesting. There were so many different cardiac anomalies, and each patient was different. One had to sit and sort out the physiology and the treatment plan. I never liked the algorithmic idea of being a provider. I wanted to think through a problem and come up with a solution. I didn’t want to check any boxes. Thus, this area was perfect for me. I probably liked it from an engineering perspective as well. It really resonated with me as an interesting field. I turned out to have very good mentoring relationships with the pediatric cardiologists in that group who were very helpful in talking about what the future could be for a nonpediatrician who wanted to deal with congenital heart disease. That was the first time I had heard about adult congenital heart disease as a specialty. Dr. David Fixler, a fantastic mentor, said to me one day, “You know, these kids grow up and we need some adult cardiologists who know how to take care of them.” So this rotation introduced me to a new idea of what I could do in adult medicine. That rotation really opened my eyes.

Roberts: As you look back over your education, are there certain mentors or teachers who had a tremendous impact on you?

Phillips: During medical school and residency, I encountered a number of teachers I wanted to emulate. There was no single person that impacted me. A composite of people along the way were important for me to understand how to be a doctor and what good practice is like. From a bedside manner standpoint, Dr. Marvin Stone set the best example.

Roberts: You graduated from medical school number 1 in your class?

Phillips: Yes (Figure 3).

Roberts: Why did you pick Baylor Dallas to do your residency and cardiology training?

Phillips: I learned during the medical residency at BUMC that there was an amazing group of cardiologists there to learn from. Not only was good medicine being practiced, but they were transferring that knowledge to the housestaff. I learned to do complicated procedures, not from some resident a year or two
older, but from a staff member with lots of experience. And, all
the staff was committed to teaching. The noon conferences and
grand rounds always provided fantastic clinical information. I was
always very interested in being a clinician, and BUMC just fit
me and gave me that nice comfort zone. The medicine residency
experience was unbelievable, with a small group of residents and a
great group of attending staff committed to medical education.

At Baylor, I was able to learn about Carol Warnes and her
practice at the Mayo Clinic. There was a conference at the Mayo
Clinic each year on adult congenital heart disease, and Carol
Warnes was one of the program speakers. I used my conference
time to go to Rochester, Minnesota, and see what it was all about.
I really liked it. I told my husband that I was going to do an adult
congenital cardiology fellowship with Dr. Warnes. It just seemed
like part of my plan. I got the cardiology fellowship at the Mayo
Clinic and it was fantastic. A pathway that I never would have
imagined opened up to me, caring for adults with congenital heart
disease in a great setting, doing what I wanted to do.

**Roberts:** You were on staff for a while after you finished your
medical residency and cardiology fellowship here at Baylor?

**Phillips:** I finished my cardiology fellowship at BUMC and
then did a 1-year fellowship with Carol Warnes at the Mayo
Clinic afterwards. I came back and was here at Baylor for less
than a year. Then the opportunity arose for me to join Dr.
Warnes’ group at the Mayo Clinic. I wanted to pursue a career
in congenital heart disease. I felt that coming immediately out
of fellowship one needed the support group of experienced clini-
cians around, and the Mayo Clinic provided that for me.

**Roberts:** How many are there in that group at the Mayo
Clinic?

**Phillips:** Full-time there are Dr. Warnes, myself, Heidi
Connolly, and Naser Ammash. Martha Grogan splits her time
between us and the heart failure clinic (she is an amyloid ex-
pert), and we added a new staffer this year, Crystal Bonnich-
sen, a trained imager in computed tomography and magnetic
resonance imaging who also completed a clinical fellowship in
genetic heart disease.

**Roberts:** What is a typical day for you now?

**Phillips:** I spend half of the day reading echocardiograms
on patients with congenital heart disease and half the day in
the clinic seeing patients.

**Roberts:** A half day is 4 hours?

**Phillips:** Yes. I start my appointment slots at 12:30 and
end at 4:30 PM.

**Roberts:** What time do you wake up in the morning?

**Phillips:** Between 5:00 and 5:30 AM.

**Roberts:** What time do you get to the hospital?

**Phillips:** Around 7:00 to 7:30 AM.

**Roberts:** What time do you leave the hospital?

**Phillips:** About 6:00 usually.

**Roberts:** You work half day?

**Phillips:** It’s not a bad life.

**Roberts:** Are you called back very often at night?

**Phillips:** I have a couple of nighttime call responsibilities.
Four weeks a year, I do all adult echo call, not congenital heart
disease. Often we are split into transesophageal echo or trans-
 thoracic echo because the volume is so big even at night. On that
call one can count on being in the hospital most nights of that
week. If on transesophageal echo call an aortic dissection patient
arrives, one may spend quite a long time at the hospital. I am on
night call for the general hospital service, but because we have
many medicine residents and cardiology fellows, I infrequently
have to go back to the hospital. Occasionally I receive calls at
night asking for advice, but I am able to pull up the electronic
record at home so infrequently have to go in.

**Roberts:** What time do you go to bed at night?

**Phillips:** Before 10:00 PM.

**Roberts:** You get about 7 hours of sleep?

**Phillips:** I need closer to 8 hours. I like to sleep.

**Roberts:** What about weekends? Do you go in?

**Phillips:** I will often go in, even though I am not on call,
to complete clinical duties—signing off on notes, making sure
letters are completed to referring physicians—and then I try to
keep some part for academic activities such as writing a textbook
chapter or a manuscript for publication in a medical journal.

**Roberts:** Everyone at the Mayo Clinic is on salary. Do you
like that?

**Phillips:** Yes.

**Roberts:** You were in private practice for a year. Did you like
that?

**Phillips:** There are aspects of private practice that are nice in
terms of being in control of your schedule. In a large multispecialty
group like the Mayo Clinic, a physician has little autonomy regard-
ing scheduling. Vacation requests are put in 15 months in advance.
There is some flexibility if something comes up, and the clinic does
work with you, but you can’t decide the next week you want to
take Friday off. That just doesn’t work. Private practice might give
you that opportunity to be somewhat more flexible, though I think
there are other constraints that keep you tied down as well.

**Roberts:** How many cardiologists are at the Mayo Clinic?

**Phillips:** About 110.
Roberts: Has the number of patients at the Mayo Clinic held up pretty well with the economy changes?

Phillips: We had a decline in patient volume when the economy was bad. We seem to be rebounding now and demand seems to be up again. Patients come from the local community and from the surrounding areas, and many patients travel long distances to see us.

Roberts: Has the Mayo medical school worked out well?

Phillips: It’s a nontraditional medical school model. I’m involved in the circulation block, teaching cardiac physiology. It’s a comprehensive block where the students learn everything from pharmacology, anatomy, physiology, and physical examination packed into a very dense course. It’s an interesting way of learning.

Roberts: How much time do you spend teaching?

Phillips: My part of the circulation block is 3 weeks long. In the morning the students may do a clinical rotation or be in the simulation center. The afternoon is lecture or small group discussions.

Roberts: Do they have anatomy classes?

Phillips: Yes, but only a short course. In our group, we see hearts with pathologist William Edwards, who demonstrates normal and abnormal anatomy. It is very good. His lectures are very good. He has a nice way of presenting the material so that one understands the anatomy.

Roberts: When do you have to retire at the Mayo Clinic?

Phillips: There is no set time if you aren’t a surgeon. For medicine physicians, we can continue on as long as we want. I hope to practice into my late 60s at least. I definitely don’t foresee retiring early.

Roberts: How do you handle those freezing winters in Rochester?

Phillips: At first I didn’t know how we were going to cope with it. My first winter, I could not believe how cold it was. When I was a fellow, my husband stayed in Dallas and the kids and I went to Rochester. We thought it was to be a 1-year gig there. My husband traveled quite a bit and saw us in the summer and fall and we spent the holidays—Thanksgiving and Christmas—in Oklahoma. Thus, from early November through mid January he had not been to Rochester. I kept telling him how horrific the cold was, that I did not want to take the trash out because I did not want to go outside, and I tried to avoid the grocery store for the same reason. He thought I was exaggerating and that it could not be that bad, but I was not exaggerating. He visited on a weekday in early February. Before I came home he had gone to Target and he said his eyeballs froze on the way out to the car. He couldn’t believe how cold it was. That first winter was very surprising to us. Then we realized that if we wore appropriate outerwear and learned how to get in and out of places, it was doable. We learned to embrace the winter. We began participating in winter sports. Our youngest daughter took up slalom ski racing for the high school. We’ve learned how to stand out in subzero weather watching our kid come barreling down a hill.

Roberts: Somebody told me that you were adopted.

Phillips: That is correct.

Roberts: Do you mind talking about that?

Phillips: No, not at all. I was adopted as an infant. My brother also is adopted. We are not genetic brother and sister. My parents couldn’t have children. Although my parents never made me feel like I had to earn my place, I always sort of wondered if that was part of my always trying to do well.

Roberts: Did you feel that you were always loved, just as if your adoptive parents were your biologic parents?

Phillips: Definitely. My mom would always say, “I chose you.” I have actually now met my biologic parents. Interestingly, my biologic mother lived only 8 miles from me my whole life and that fact was not known to my family or to her. I don’t think the state meant for that to happen. My biologic mother had no other children.

Roberts: Was meeting your biologic parent hard to do?

Phillips: It was hard in the sense that I had built up a fantasy of who I was, of what it was like to be placed for adoption, of who my biologic parents actually were. The reality was hard to accept that my biologic mother couldn’t raise a child so she did the next best thing—put me up for adoption.

Roberts: How old were you when you met your biologic mother?

Phillips: I was in my 30s.

Roberts: You met your father too?

Phillips: Yes. I met him shortly after meeting my mother.

Roberts: How did you find her?

Phillips: It was very hard to actually find her. I initiated the contact but had to use a private investigator to find her. She of course knew the name of my biologic father whose name was not in any records. He had an unusual name and still lives in the same place he had grown up in. I’ve had a really nice relationship with him. He has two other children, so I have two half-siblings, whom I have gotten to know and have a relationship with. Although I was the youngest in my adopted family, I am the oldest sibling of my biologic family. My biologic father is a fantastic guy and is married to a wonderful woman.

Roberts: What does he do?

Phillips: He is an engineer.

Roberts: Wow. Great story! How did your adopted parents handle your desire to meet your biologic parents?

Phillips: They were very supportive. They know that there is no doubt in my mind that they are my parents. My search was not ever about finding my biologic parents to replace my adoptive parents. My relationship with my adoptive parents is too solid.

Roberts: It sounds like your biologic mother and father were not very close?

Phillips: Correct. Not at all. They had met in college. My biologic father was drafted and went to Vietnam. I was born while he was in Vietnam. My biologic mother made the choice to not get married and to put me up for adoption.

Roberts: Did he know that she was pregnant?

Phillips: Yes. He had wanted to marry her!

Roberts: She sounds as though she was a very independent woman.

Phillips: Definitely!
Roberts: You must have gotten some of that independence from her.

Phillips: Right. I think that is a good observation.

Roberts: Both of your biologic parents sound like they were very intelligent people.

Phillips: Yes, I think that both of them are quite smart. Both of them went to college. I think circumstances were such that neither was as successful as they could have been.

Roberts: Are you glad you met your biological parents?

Phillips: Yes. It gives me a little more understanding of who I am. That’s not the case for every adopted person. My brother has no interest in knowing his biologic parents. It’s not something that he needs to fulfill.

Roberts: Do you have hobbies? Do you and your husband do a lot of things together?

Phillips: We like to travel. Those early family vacations got me going. I like to see new places. We have been very blessed to get to travel to different parts of the world and to see some great things. We both enjoy that quite a bit. We try to stay sporty and active. Especially during the last 5 years, we’ve tried to make being physically fit a priority with the understanding that “putting health in the bank” is the way to enjoy retirement. It’s not a guarantee but it certainly makes it better if you don’t develop coronary disease at 50 and keep your weight under control and don’t get diabetes. We pursue our fitness separately. He and our youngest daughter have joined Taekwondo together. They both have black belts. We snow ski as a fun family thing.

Roberts: Do you still read a lot?

Phillips: Yes.

Roberts: What do you read now?

Phillips: I still read a lot of fiction. I love political thrillers—Daniel Silva, very low-brow reading. I rarely read the classics or contemplate Shakespeare. One of the best presents I ever got was a Kindle. I now read a book every other week.

Roberts: What about meals when you get home? Who does that?

Phillips: Over the last couple of years, that has been Nathan’s responsibility. He’s really taken that on and has been very enthused about trying to find healthy meals. We’re not vegan or vegetarian but we try to incorporate a lot of healthy food into our meals. He’s really into finding healthy recipes.

Roberts: He works where now?

Phillips: He’s a field application engineer. When we moved to Minnesota he was working for a company called Intersil. He is now working for International Rectifier. His work is very technical.

Roberts: What are your daughters’ names, and when were they born?

Phillips: Victoria Elaine was born on October 28, 1992, and Amanda Leigh was born on March 4, 1997 (Figure 4).

Roberts: How many more kids are you going to have?

Phillips: Unfortunately, that’s it. Life kind of passed by while I was training. I love my family! I would have liked to have more children, but two is good.

Roberts: Neither of your girls is interested in medicine?

Phillips: Correct. I think our oldest daughter would be a good physician, not a one-on-one physician, but a good researcher. She’s very artistic. She is studying architecture at Washington University in St. Louis. Amanda toys occasionally with the idea of medicine but she really likes the idea of physics and engineering. My husband keeps hoping my oldest will change her mind and go to medical school.

Roberts: Is religion a major part of your life?

Phillips: Yes. I consider myself relatively religious, a Protestant. Having a faith-based aspect of my life, I think, helps me in medicine.

Roberts: You have got a great story. Any additional comments?

Phillips: At a meeting in Chile a few weeks ago, I commented that I didn’t know how I got such a good life. It’s a pretty darn good life, and I am very thankful to have gotten the opportunities that I have.

Roberts: Sabrina, you are great. Many thanks for sharing your life so openly with our readers.
Good evening, Dr. Federoff, Dr. Mitchell, class of 2017, members of the Magis Society, fellow faculty, family, and friends. What a happy occasion! We are gathered here in historic Gaston Hall to welcome the class of 2017 to Georgetown University, its school of medicine, its Jesuit tradition—to celebrate their public entry into the profession of medicine—and in speaking to you, I hope to honor our beloved Dr. Edmund Pellegrino.

Two years ago, as I finished teaching rounds at the hospital, one of our junior students asked if I would deliver a message to the incoming freshman: “Please tell them it’s worth it!” She beamed 3 months ago as she crossed the stage and accepted her medical degree. Her smile said it all: “It’s worth it!”

Today I will speak to you of three things: my class, your class, and your most important teacher, the patient.

My class entered medical school in 1950, over 60 years ago. The demographics were a bit different. We were all male and were older; we had grown up in the Great Depression, and more than half had served in the military in World War II, fighting in Europe or the Pacific. All of us would serve in the military in time. Times were different, simpler I guess. The country was united, even optimistic. It was a society of duty, self-restraint, and devotion to country.

As a freshman, it was anatomy lab from 1:00 to 5:00 every afternoon from Labor Day to Memorial Day. You could always tell a freshman: they smelled of formaldehyde! In pharmacology, we were promised you only needed to know 10 drugs. We discovered every drug had 10 names and by the time we were comfortable with one, it became obsolete! In bacteriology, they taught every detail of diseases that disappeared shortly after we began practice: polio, enteric fever, rheumatic fever. We learned nothing of genetics. Most of us served 2 years in rotating internships in dilapidated city hospitals built in the 19th century, working every other night under limited supervision, and then two thirds of us entered primary care, moving into small communities developed in the post-war era.

The science of medicine exploded after World War II, with new specialties, new treatment, and even new diseases. The prototype new disease appeared in the early 1980s. First, a 21-year-old man thought to have a viral pneumonia was discovered to have pneumocystis. Then, a young man with purple lesions on his legs was thought to have a hematological disorder and was discovered to have Kaposi’s sarcoma. A patient with a fatal febrile debilitating neurological disorder, following a contaminated blood transfusion, was found to have a new virus named HIV, and the AIDS epidemic was identified. Peptic ulcer disease was discovered to be an infectious disease, and we didn’t believe it! During long residencies, we were taught complex operative techniques with complex names like Roux-en-y, procedures that became obsolete shortly after we began to practice. They were replaced...
by laparoscopic techniques, and even now they are replacing us with robots.

Despite it all, it was exciting and enjoyable and we loved it. Fifty years after graduation, we met at our reunion and all agreed we made a great choice of a profession. We commented that “we practiced during the golden era of medicine.” Actually, I hear that from every generation of physicians and so it will be with this group!

In recent years, I have become aware of the concerns of many students and parents. They wonder: Is medicine a good choice for a career? They sense the frustrations of their family physicians. Periodically in Washington, they round up the “usual suspects”—the politicians, lobbyists, insurance and pharmaceutical executives—to restructure our health care system with their ideas and self-interests. One can but recall the words of the great 19th-century American orator, Edward Everett Hale, after a visit to Washington. He was asked: “Do you pray for Congress, Mr. Hale?” He responded, “Frankly, after meeting them, I pray for the country.” Little has changed. We are still praying. But fear not, my friends. What you are hearing about is only the superficial layer, the outer shell, of a great profession. Deep inside are many more layers, with unlimited opportunity.

But what can you, the class of 2017, expect? In a recent thought-provoking book, The Creative Destruction of Medicine, the brilliant Dr. Eric Topol attempted to anticipate future changes in the health care delivery system. He commented on changes such as use of smartphones for complex diagnostic challenges and personalized medicine with use of genetic information. He even suggested that the stethoscope, so revered here at Georgetown, will be replaced by a handheld ultrasound device. He admitted to not using his own stethoscope for over 2 years, which suggests to me he never learned to use it properly and appreciate its value. Despite all these future advances, he probably hardly scratches the surface.

Today, you will do two things that mark your official entry into the profession of medicine. First, you will be robed with the white coat, the sacred symbol of healing, of compassion, of hope. Second, you will recite the ancient oath of Hippocrates, the oath that unites physicians worldwide and throughout the ages in the art of healing. In taking the oath you will commit to the highest standards of the profession. You will become a professional—today, now. What is a professional, you may ask? A professional is someone who accepts the responsibilities, the obligations, and the sacrifices that go with the privilege—and, indeed, it is a privilege to study and practice medicine. But above all, a professional is someone who always places the interest of the patient above his own.

How can you do this in the early years of medical school? You face lectures, laboratories, constant study, with frequent moments of frustration, confusion, loneliness, and a feeling of there being no end in sight. It is “the dark night of medical training.” But, remember, the making of a physician is a long process, lifelong even. We are naturally impatient to reach the end. We would like to skip the intermediate stage that is so necessary. But we know that true progress is made by passing through periods of discouragement, uncertainty, and even high anxiety. So we need to be patient, patient with what is forming within ourselves. Be patient—especially with ourselves. Francis de Sales called patience the greatest and most difficult of virtues. Recall that it was the first- and second-year students who thought of and designed the wonderful Hoya Clinic, which has exceeded all expectations. And it began with a simple idea: “Doctors for the street people.”

Soon, you will meet your first patient, the cadaver. He will not speak to you, but will teach you much. Remember, you will be dissecting the remains of a very special human being—someone whose last thoughts before dying were to help others, by instructing you. What a gift! The cadaver is the beginning of your patient-focused professional life. And, before you know it, the clinical years arrive, and the patient now becomes the full focus of your learning!

Let us further consider the patient. Who is the patient? The patient is a fellow human being who has become sick. To become a patient is to be uncertain, anxious, frightened, no longer in control. To become a patient is to imagine the worst and, at the same time, deny being sick. To become a patient is to be angry, demanding, sensitive, suspicious. To become a patient is to be sad, to be lonely, to cry. You who focus on the patient will learn much. From the patients’ anxieties, you will learn equanimity. As you observe the futilities of their hostilities, you will learn love. As you deal with their despair, you will instill confidence and optimism. As you share their suffering, you will admire their patience, their courage, their strength, and the power of their faith. As you experience their death, you will see life. You will recognize the limitations of materialism, the narrowness of self-seeking all the vanities of the world. You will ask: What is important in life? You will conclude that only in caring for other human beings can life have true meaning and can individuals find happiness. You will recall the words of the great physician Albert Schweitzer in speaking to physicians and students: “I don’t know what your destiny will be, but one thing I do know: The only ones among you who will be really happy are those who have sought and found how to serve!”

If you become fully attentive to your patients, you will see the incredible complexity and depth of the human psyche. You may even view humanity’s common ground, deep within all of us. You will share daily in the great mysteries of life. We learn, we mature through sacrifice by giving of ourselves in the service of others. By discovering and understanding the human aspects of our patients, making them more human, we become more human. Less technician, more clinician!

Every so often a generation of physicians is asked to perform a very special task. And so it is with you, Class of 2017. When they were rounding up the “usual suspects” to reform the health care system, they failed to include two important groups: the practicing physicians (who are too busy) and the patients (who lack organizational support). What can be done about it? Future physicians will need to become strong patient advocates, protecting their patients from decisions made by others, complex diagnostic and therapeutic decisions. You must insist that
your patients get the best specific care for their condition—not “managed care.” (Is there a better oxymoron than “managed care”?) The most important role of a future physician will be as a strong patient advocate!

So there you have it, Class of 2017. Welcome to the exciting profession of medicine. You are being given the opportunity to be part of the greatest of all professions, at its greatest moment. You can grow as a human being, in knowledge, in technical skill, in the very goodness of your being, to reach the pinnacle of your gifts and talents as you care for others.

You come here with a “tiny” flame burning inside of you. We plan as teachers to throw a few logs on that flame and create what the French call “the sacred fire,” that incredible, wonderful, unquenchable desire to maximize one’s knowledge and talent. Yes, today you begin the longest journey of your life, so the philosophers say, the journey that brings the talents and skills of the mind and hands to the heart and extends them further in the service of others. And as you do, remember the patient, the patient, the patient. He needs you now as never before.
A medical student trapped behind the Berlin Wall, 1961

S. Robert Lathan, MD

In the October 2013 issue, I wrote of my Johns Hopkins medical student experience in 1961 at Guy’s Hospital in London (1). After that visit, I traveled in Europe. In early August 1961, I was in the Hofbräuhaus in Munich and met a German man named Klaus who asked if I planned to go to Berlin, where he lived. I didn’t have a scheduled itinerary in Europe, but Klaus continued to encourage me to go to Berlin and gave me his telephone number.

A few weeks later, I was available to travel to West Berlin and found lodging near the bombed church on Kurfürstendamm. The next day I had a bus tour to East Berlin and had to drive through the Brandenburg Gate, the landmark of Berlin. Later I called Klaus who invited me to have dinner with him at home. His father, who worked for the newspaper, asked if I had seen East Berlin. I related I had already toured it, but he said I should go back again. I asked why, and he said, “Something new is going on but I can’t really say what.”

I had one more day in Berlin and decided to go back again. It was Sunday, August 13, 1961, and I could see water cannons spraying against the crowds periodically. I walked right up to the Brandenburg Gate, and the guard asked for my passport and let me through. I immediately saw another man who asked if I was an American; when I said yes, he said he was Canadian and that we should stay together.

About 100 yards from the gate, we could see armed East Berlin (Russian) troops marching along with tanks. Along Unter den Linden, we had a small lunch, which cost only about 30¢, as the currency in East Berlin was only 20% that of West Berlin.

An hour later at the Brandenburg Gate, the troops and tanks had multiplied significantly. A guard at the gate crossed his arms against his chest and shouted “Nein! Nein!” to us every time we said that we had to get back to West Berlin. We and all other citizens were forbidden to cross through the gate into West Berlin. Finally, the guards explained that the only way we could get out was at Potsdamer Platz via the U-Bahn (subway). As we found the U-Bahn, it seemed that I was the only American in East Berlin. I told my Canadian friend that we “might be on our way to Siberia.”

Somehow, we got to Potsdamer Platz into West Berlin. As we were taken back again to Brandenburg Gate, we could see the new wall being built with tangles of barbed wires, causing a divided city. The barricade wall was 103 miles long, an average of 12 feet high, and guarded by 300 watch towers. During the summer of 1961, over 1000 refugees a day left from East Berlin to West Berlin. The city’s population was reduced from 4 million to 2 million. The border between east and west went up almost overnight while most Berliners were asleep.

From that day on August 13, 1961, a wall separated the city for almost 30 years (Figure). It was a struggle between Soviet Communism and freedom. The wall became a symbol of the Cold War. In June 1987, President Ronald Reagan challenged Soviet leader Mikhail Gorbachev at the Brandenburg Gate, “Tear down the wall!” It was finally taken down on November 9, 1989.

Most physicians, nurses, and administrators are able to get to work every day because of petroleum. Most of us in the USA and indeed in the Western world are at the mercy of petroleum. I became conscious of its importance 40 years ago, as did so many others, when the world experienced its first “oil shock” as Arab exporters declared an embargo on shipments to Western countries on October 17, 1973. The embargo of the Organization of the Petroleum Exporting Countries (OPEC) was prompted by US military support for Israel, which was repelling a coordinated surprise attack by Arab countries that had begun on October 6, the sacred Jewish holiday Yom Kippur. The prices of gasoline quadrupled over the next few months. The crisis challenged the US’s position in the world, polarized its politics at home, and shook the country’s confidence. I remember reading a number of articles at the time indicating that the world’s supply of oil would be depleted within 30 years, which meant of course 2003. But instead, the crisis produced the birth of the modern era of energy.

Although the OPEC embargo seemed to provide proof that the world was running short of oil reserves, the move by Arab exporters did the opposite: it provided massive incentive to develop new oil fields outside the Middle East—what became known as “non-OPEC”—led by drilling in the North Sea and Alaska. Although the Prudhoe Bay oil field was discovered in Alaska 5 years before the crisis, environmentalists had prevented approval for a pipeline to bring the oil down from the North Slope. Only in the immediate aftermath of the embargo did a shaken Congress approve a pipeline that eventually added, at its peak, as much as 2 million barrels a day to the domestic supply.

The push to find alternatives to oil boosted nuclear power and coal as secure domestic sources of electric power. The 1973 crisis spawned the modern wind and solar industries also. The same year Congress passed the first Corporate Average Fuel Economy Standards, which required automakers to double fuel efficiency—from 13.5 miles per gallon to 27 miles per gallon—ultimately saving 2 million barrels of oil per day. (In 2012 the standards were raised to 54.5 miles per gallon by 2025.) The crisis also set the stage for the emergence of new importers. In 1973, most oil was consumed in the developed economies of North America, Western Europe, and Japan. These regions consumed two thirds of the oil as recently as 2000, but now oil consumption is flat or falling in those economies and virtually all growth and demand is in developing economies, now better known as “emerging markets.” They represent half of world oil consumption today, and their consumption and share will continue to increase. In October 2013, China overtook the US as the world’s largest net importer of oil!

The 1970s also were years of natural gas shortages, which turned into a bitter political issue. What has solved the shortages were not more controls but their elimination, which resulted in an oversupply that became known as the “gas bubble.” Today, natural gas is the default fuel for new electricity generation.

The oil crisis of 1973 resulted later in major political shifts for the US in political friends. In 1973, Iran was one of the US’s strongest allies in the Middle East. Indeed, Tehran did not participate in the embargo and pushed oil into the market. Since the 1979 Islamic Revolution, however, Washington and Tehran have been adversaries. Meanwhile, Saudi Arabia, which was at the center of the 1973 embargo, is now the US’s strongest Arab ally.

The real lesson of the shock of 1973, and the second oil shock set off by the overthrow of Iran’s shah in 1979, is that they provided incentives and imperatives to develop new resources. Today, total world oil production is 50% greater than in 1973! Exploration in the North Sea and Alaska was only the beginning. In the early 1990s, offshore production expanded into the Gulf of Mexico, opening up deep water as a new oil frontier. In the late 1990s, the Canadian oil sands embarked on an era of growth, and today it is a larger source of oil than Libya before its 2011 civil war.

Most recent is the development of “tight oil,” the spinoff from shale gas which has increased US oil output by more than 50% since 2008. This boom in domestic output has increased the energy supply, and combined with shale gas has had a much wider economic impact on jobs, investments, and household income. As these tight oil supplies increase, and as the US auto
fleet becomes more efficient, oil imports have declined. Imports reached 60% of domestic consumption in 2005, but they are now down to 35%, the same level as in 1973.

As the US imports less oil, its energy is more secure. There are several million barrels of oil now “missing” from the world oil market, owing to sanctions on Iranian oil, disappointments in Iraqi production, and disruptions to various degrees in Libya, South Sudan, Nigeria, and Yemen. The shortfall is being partly made up by Saudi Arabia, which is producing at its highest level.

But the growth in US oil output has been crucial in compensating for the missing barrels. Without it, the world would be looking at higher oil prices, there would be talk of a possible new oil crisis, and no doubt Americans would once again start seeing images of those gas lines and angry motorists from 1973.

Most of the above came from the work of Daniel Yergin, the most influential voice on energy in the world. His book *The Prize*, published in 1991 and containing 908 pages, was the bible for oil history (1). Because of the many changes between 1991 and 2011, Yergin wrote *The Quest*, an 804-page book examining what has happened since 1991, and he provides many suggestions to further decrease our consumption of oil and therefore improve our environment (2). Whether we like it or not, he opines, oil will be our major source for transportation worldwide for at least the next 20 years.

**CLIMATE CHANGE**

My brother sent me Linda Marsa’s recently published book, *Fevered: Why a Hotter Planet Will Hurt Our Health—and How We Can Save Ourselves* (3). Whether we like it or not, the climate is changing and changing for the worse, and the changes will lead to more health problems than ever before. Marsa writes, “While 2012 was the warmest year on record—and the continental United States was gripped by an unprecedented number of droughts, floods, and super storms—what we are seeing is, quite literally, the tip of the iceberg.” We are on the threshold of transformative changes in which natural calamities will convulse the globe, possibly leading to unlivable cities, widespread famine, civil unrest, wars over dwindling resources, the extinction of at least half the species on Earth, the death of the oceans from growing acidity, and wars over dwindling resources, the extinction of at least half the species on Earth, the death of the oceans from growing acidity, and hundreds of millions of desperate people uprooted by drought, floods, fires, and other weather-induced catastrophes.

Dust storms. Marsa begins with a description of the Black Sunday Dust Storm on Palm Sunday in April 1935. Although there had been almost 50 dust storms in the previous 3 months, the one on that fateful Sunday howled across a parched landscape baked by years of drought and record-breaking heat that often soared into the triple digits; these storms had already blown out 5 million acres of farmland and destroyed most of the wheat crop in Kansas, Nebraska, and Oklahoma. But on that day, a severe storm front had been building 800 miles to the north along the Canadian border, where a warm high-pressure system that had been squating over the Dakotas collided with a cold front from the Arctic, producing blizzards with gale-force wind, frigid temperatures, and heavy snow in Montana. As the cold front moved southward across the high plains and the Texas Panhandle, the churning winds collected even greater force, kicking up a black wall of soil >10,000 feet high, containing 300,000 tons of dirt and generating enough static electricity to power New York City. The storm creeping across the Great Plains started as a faint roar in the distance. Birds grew agitated, nervously fluttering and chattering. Cattle tied up in barns bellowed in fear, and rabbits frantically galloped across the prairie. By the time the roar reached its deafening crescendo, whole ranches were buried under a rolling wall of black dust. In many areas, the brutal storm arrived with little warning, leaving many stranded outdoors with no protection. Hundreds of people were buried alive and countless heads of livestock chocked to death. In autopsied carcasses, animals’ sides were found to be packed with mud. Trains derailed and cars stalled on the sides of roads, their engines clogged with dirt and their occupants slowly suffocating.

Black Sunday, the occasion of the worst dust storm in US history, provides a grim snapshot of the devastation of the 1930s Dust Bowl and what happens when the weather goes haywire in a landscape that has been drastically altered by human development. Drought and destructive agricultural practices that had eroded the soil set the stage for the worst environmental disaster in American history. Just a few inches underneath the fertile soil that extends over the hundreds of thousands of square miles of the Great Plains is sand. These vast expanses of land were once semiarid grasslands only lightly grazed by buffalo and traveled by the Native Americans who subsided on them for thousands of years. This environmental devastation and its human aftermath were famously captured in John Steinbeck’s *The Grapes of Wrath*.

Linda Marsa states that the Midwest and Southern Plains are likely to tip into desert once again as temperatures continue their inexorable climb. The effect of a warming planet on our health is a threat that has been completely neglected, marginalized, and ignored by the global health community and by policy makers, and yet in terms of our well-being, in terms of our survival over the next 100 years, it is absolutely the top public health issue that we should be talking about.

Marsa indicates that the Great Plains actually were unsuited to farming but an unusual stretch of wet weather, new technologies that produce more efficient tractors and combines, and inflated grain prices triggered a land boom that resulted in the plowing of >100 million acres, from a relatively scant 12 million acres a few decades before. When it rained, livestock flourished, crops were abundant, and farmers celebrated record-breaking harvests. Throughout the 1920s the prairie was a beacon of prosperity in an America that would be ravaged by economic calamity by the 1929 stock market crash, which led to the Great Depression. But when drought struck in 1931, no one was prepared. That the very process of cultivating the land would somehow change the climate was not considered. Crop prices crashed as the Great Depression deepened and emaciated cattle died in the fields. Some who chose to hang on in their houses crammed every cranny with wet clothes, sheets, and gunny sacks in futile attempts to keep out the dust. Even on clear days the air was so dry that just breathing would sear the lungs, forcing people to wrap damp bandanas over their mouths and noses and
coat their nostrils with petroleum jelly if they dared to venture outside. Many were isolated by the storms, which crippled cars and machines; they were marooned for days on end without food, barely surviving on the ragged edges of poverty. Some were driven mad by the never-ending dust.

By 1935, inhabitants began to abandon the Plains in what became the largest mass migration in US history. By the end of the decade, on the eve of World War II, >2 million people had been uprooted—including 85% of the population of Oklahoma—and 500,000 more were left homeless. Deserted farm houses covered the landscape, and the community schools, churches, banks, and businesses were shuttered, leaving behind ghost towns.

Aside from the profound psychological toll, there also were serious health consequences from living in a dust-choked environment where summer temperatures soared to 120°F and air-conditioning was extremely rare. Simply venturing outdoors could prove fatal. Many suffered from malnutrition and starvation, and many subsisted on pickled tumbleweed, yucca roots, and road kill. Even the dust itself was lethal: the churning winds milled the soil into an extremely fine particulate with a high silica content, which scratched throats and eyes and penetrated deep into the lungs, causing a potentially lethal condition known as dust pneumonia or the brown plague, similar to the black lung that developed in coal miners. Although no definitive public health records were kept during that period, it is estimated that 7000 people suffocated from the dust and thousands more were permanently incapacitated, condemned to a lifetime of hacking coughs and respiratory difficulty.

Will we see the Dust Bowl conditions again? Marsa’s answer is “absolutely.” She indicates that by the end of this present century we can expect the midsection of the USA to be gripped by extreme droughts and baked by 90°F days for more than half the year. We will no longer call them droughts because the land will simply become desert. The cover of the November 1, 2012, Bloomberg BusinessWeek noted after Hurricane Sandy turned much of the northeastern USA into a gigantic disaster zone: “It’s global warming, stupid.”

Rising temperatures and greenhouse gases. Starting in March 2012, much of the nation sweltered under triple-digit temperatures—3282 daily temperature records were broken in the month of June 2012, and July was the hottest month since record-keeping began in 1895. A severe wind storm, a type called “Derecho,” swept across hundreds of miles, with wind gusts up to nearly 60 miles per hour and lasting >6 hours, and cut off electrical power to nearly 4 million people in Ohio, Pennsylvania, West Virginia, and Virginia for up to a week. The exceptionally dry conditions ignited raging wildfires across the Western USA that incinerated >7 million acres. The heat also contributed to the record-breaking drought, the worst since Dwight Eisenhower was president, that engulfed 80% of the continental US by mid July, affected 165 million Americans, and decimated 65% of cattle production and 75% of the corn crop.

At the end of October 2012 came Hurricane Sandy, which has been described as “historic” and “unprecedented.” The sheer energy generated by the storm surge and the destructive potential of the waves in its wake reached 5.8 on the National Oceanic and Atmospheric Administration 0 to 6 scale, the highest ever measured. Exceptionally high ocean temperatures brought this very last season Atlantic hurricane barreling up the East Coast to crash into a cold front that was coming down from Canada. The front’s frigid air was fueled by the unprecedented September melting of Arctic ice, which had shriveled to 1.3 million square miles, the smallest ever recorded and less than half the area it had occupied only 40 years earlier. The collision of these two weather systems turbocharged Sandy and transformed it into a “Frankenstorm” that stretched about 850 miles and caused historic destruction and catastrophic flooding in the nation’s most populated regions. At least 110 people were killed and thousands lost their homes. Enormous swatches of the electrical grid failed, leaving millions—including much of lower Manhattan—without power for days and some for weeks. New York’s entire subway system was shuttered for days; LaGuardia Airport was submerged, and many of New Jersey’s iconic beachfront resort towns were turned into piles of kindling. As the weeks wore on, many stranded residents were sickened by serious respiratory infections and developed what came to be known as “Rockaway Cough.” As the planet gets hotter, we will live sicker and die quicker!

Indisputably, the planet is heating up. For >100 years, scientists have cautioned that burning fossil fuels like coal and oil would cause global warming because these fuels add enormous amounts of carbon dioxide to the atmosphere. Carbon dioxide is considered a “greenhouse gas” because it creates a hothouse effect by absorbing infrared radiation from the sun, inhibiting the planet’s natural cooling mechanisms. While greenhouse gases are normally present in the environment—plants use CO₂ for photosynthesis and we exhale CO₂ every time we breathe—we have released tons more into the atmosphere since coal came into widespread use in the early 19th century at the dawn of the Industrial Revolution. With more carbon-spewing vehicles and factories constantly coming online to accommodate population growth, carbon emissions continue to climb. By 2011, annual global carbon dioxide emissions had reached 31.6 gigatonnes, an increase of 3.2% over the previous year. (A gigatonne is 1 billion tonnes, equivalent to about twice the mass of all 7 billion people on Earth twice. This means that 31.6 gigatonnes is more than 60 times the aggregate weight of every single person on planet Earth.) That figure is expected to rise about 3% annually as the population swells and more people around the globe enter the middle class and consume more energy.

According to some scientists, the temperature will rise by about 4°F by the end of this century, which could make the Earth hotter than it has been since the dawn of civilization. The planet today on average is 1.4°F warmer than it was 100 years ago and probably hotter than it’s been in at least 1000 years. The sea ice is retreating; permafrost and glaciers are melting; species are migrating northward to find more hospitable climates. Tree-ring data culled from the last millennium showed temperatures
are climbing and spring thaws occur a week earlier and winter freezes commence a week later than they did 50 years ago. Numerous studies have shown that the last 2 decades of the 20th century were the hottest in 400 years and perhaps the warmest in several millennia.

Rapid ocean acidification, which increased by 30% in the past century, is another tipoff. The oceans are the world’s carbon sink, absorbing about 50 times more CO₂ than the air does. But CO₂ forms carbonic acid when it dissolves in water. As a consequence, rising CO₂ emissions are fueling the growing acidity of the oceans, which is killing seafood species, coral reefs, and organisms at the foundation of the ocean food chain. By 2050, if carbon emissions continue at current rates, the alkalinity of the ocean will be lower than at any time in the last 20 million years, a change that is occurring 100 times faster than at any time since Earth was formed.

Industrialization, deforestation, and pollution have supercharged the concentration of greenhouse gases such as carbon dioxide, methane, and nitrous oxide in the upper atmosphere. These gases absorb extrasolar radiation and then release that excess heat into the lower atmosphere, inhibiting planetary cooling and creating a hothouse environment under the carbon canopy that amplifies temperatures on the Earth’s surface. And all this has happened since the Industrial Revolution.

Effects of rising temperatures on the ecosystem. In the coming decades, as Marsa indicates, the higher temperatures will have numerous effects on our ecosystems: higher levels of ozone pollution in the air we breathe; more uncontrolled outbreaks of deadly infectious diseases as mosquitoes migrate to newly warm habitats; and more extreme weather events. Hot air holds more water so we will have more torrential rains, more ferocious hurricanes, and, conversely, more dry spells as a result of heat-induced changes in rainfall patterns. Rising temperatures could trigger pestilence, drought-induced food shortages, raging firestorms, massive migrations, political instability, and wars, even the return of bubonic plague, the Black Death that killed more than 25 million people in the Middle Ages. And then there are the debilitating injuries and deaths that come with increasingly violent and more frequent hurricanes, floods, and fires and the chronic illnesses exacerbated by being left untreated for lack of medical care after weather-related calamities. So, we must expect more of the likes of Hurricane Katrina, the tornado that hit Joplin, Missouri, and superstorm Sandy.

As Linda Marsa writes, “In the absence of meaningful mitigation and adaptive strategies, we are on the cusp of a terrifying and increasingly unhealthy future. . . . We are going to see incremental changes in the next 5 or 10 years but that might not compare to what we are going to see in the next 30 or 40 years.”

According to a noted meteorologist, “It only took 1 degree to cause the 1930s Dust Bowl. Just 1 degree change in the surface temperature of the oceans cut off the pipeline of moisture that normally travels north from the Gulf of Mexico and triggered the long dry spell.”

While there have been some noticeable fluctuations, according to Marsa, for the past 12,000 years, we have enjoyed a relatively stable climate that has allowed civilization to flourish. But we are now on the threshold of transformative changes in the weather. There is, however, a pervasive and falsely comforting belief that climate change will happen slowly, that the globe will heat up uniformly, and that the predicted devastation will not occur until long after the Baby Boomer generation has died of old age. The developing world—Africa, Asia, and South America—will bear the brunt of the toxic legacy of wealthier nations’ addiction to fossil fuels. But even relatively affluent Americans will not be observing this seismic shift from a safe insulated distance.

Studies from the Centers for Disease Control and Prevention (CDC) indicate that these climate changes will not be gradual but will appear as extreme events. The freak weather patterns occurring across the USA in recent times confirm that Earth is warming at a swifter pace than even the direst forecast predicted just a few years ago. Since the presidency of Kennedy, the USA has heated up more than 2°F, a change greater than the warming average for the whole planet. Winters are now shorter and warmer than they were 30 years ago, with the largest temperature rises of >7°F measured in the Midwest and northern Great Plains.

No matter how fast we move to reverse this trend by drastically cutting emissions, temperatures will continue to climb because of the heat-trapping carbon dioxide that has already been dumped into the environment. Carbon dioxide lingers in the atmosphere for centuries, while oceans absorb the heat by warming and releasing it back into the air for hundreds of years. Over the next century the thermostat will climb another 2°F to 11°F on average, a range that is contingent upon what we do to reduce greenhouse gases, according to projections from numerous governmental studies done both in the US and abroad. When the amount of carbon dioxide in the atmosphere climbs from the current 393 parts per million (PPM) (up from about 298 PPM in 1900) to 600 to 700 PPM and beyond by the end of this century, as climate modeling scenarios now anticipate, we will be living under a carbon blanket far worse than the suffocating cloud of smog that envelops today’s most polluted megalopolises (Beijing and Shanghai). Conditions such as these will not only make breathing a chore, they will change the climate in ways so profound and cause such vast and far-reaching disruptions to our ecosystem’s rainfall and water supplies that the world will be virtually unrecognizable.

Based on current projections by the National Center for Atmospheric Research, Earth’s most populated areas—a huge expanse of land extending from northern Canada to the southern tip of South America, parts of Asia, and most of Australia and Africa—will be parched by drought by the century’s end, drying up surface water and killing crops that hundreds of millions depend upon for survival. A 5% Fahrenheit rise is at the very outer edge of what we may be able to manage; anything higher than that raises serious questions about our survival as a species. Climatologist James Hansen, the chief climate scientist at NASA’s Goddard Institute for Space Studies in Manhattan, stated, “Human-made climate change is almost certainly going
to be the greatest moral issue of this century. . . . It’s hard for people to recognize that we have a planetary emergency.”

Many scientists now believe we are on the tipping point that could unleash unstoppable forces. Melting permafrost in Siberia could belch millions of tons of methane—a greenhouse gas 20 to 70 times more potent than carbon dioxide—into the atmosphere and change the climate abruptly and cataclysmically, and some areas, especially here in the USA, will be more impacted than others.

Newly industrialized developing nations such as Brazil, China, India, Indonesia, Mexico, and Turkey are rapidly creating a huge middle class that will demand more goods and create more pollution, putting additional pressures on a global ecosystem already buckling under the weight of human consumption. Vast stretches of the world could become virtually uninhabitable, forcing the exploding population—expected to reach 9 billion by 2050—to squeeze into ever smaller patches of livable land. The rule of thumb is that every 1°C rise in temperature (a little less than 2°F) decreases crop yields by 10%. Higher temperatures halt photosynthesis, prevent pollination, and lead to crop dehydration. How will we grow more food to feed all these extra people on a planet with more frequent droughts, floods, and heat waves? Food prices could double, pushing billions into starvation. Radically rising sea levels and the massive desertification of the grain baskets of the world, among other problems, will make it very hard for even the most developed economies to survive.

Rising temperatures and health. The World Health Organization (WHO) estimates that worldwide over the past 3 decades 150,000 people have died as a result of a warming planet—mainly from increased mortality due to high rates of malaria, diarrheal diseases, and floods—and 5 million cases of illness can be attributed to it annually. Up to 5 million deaths occur each year from air pollution, hunger, and disease as a result of climate change and emissions from carbon-intensive economies.

WHO has identified >30 new or resurgent diseases in the last 3 decades. The incidence of dengue fever, long thought eradicated in the USA and once close to being wiped out in South America, is now climbing in the Western hemisphere. The number of people hospitalized in the USA with it tripled between 2000 and 2007, according to the CDC, and the species of mosquito that spread dengue fever have established a firm foothold in the continental USA.

A hotter planet is also promoting the spread of numerous other vector-borne pathogens from ticks, mice, and other carriers of potentially deadly microbial hitchhikers surviving milder winters and fanning out across the country into newly suitable habitats, transmitting Rocky Mountain spotted fever, equine encephalitis, St. Louis encephalitis, and babesiosis, a once uncommon malaria-like infection. Lyme disease has migrated from Connecticut and New York to the Canadian border and westward to the Great Lakes region. The sweltering summer of 2012 saw the largest outbreak of West Nile virus ever in the USA, according to the CDC, with 38 states reporting 1118 cases, including 41 deaths.

Heat waves, like the one that killed >70,000 people in Europe in 2003 and 2005, are projected to become common. In 2010, Russia wilted under its most intense heat wave in 130 years of record-keeping with daily highs in Moscow hitting 100°F instead of the normal summer average of 75°F. Severe droughts ignited wildfires in the countryside, smothering Moscow in poisonous smog for 6 straight days. The combination of unprecedented heat and suffocating haze doubled the death rate to an average of 700 a day and >52,000 people overall.

Big cities will feel the heat more acutely because of their high concentration of asphalt, buildings, and pavement, which tend to absorb more heat in the day and radiate less heat into their immediate surroundings at night than rural areas do. Therefore, built-up areas get hotter and stay hotter, creating “urban heat islands” in which temperatures are 5° to 10°F warmer than surrounding areas. In the not-so-distant future, major metropolises like New York, Chicago, Philadelphia, and Phoenix could become uninhabitable hot zones for months at a stretch, triggering the deaths of thousands.

Allergies and asthma have reached epidemic proportions in industrialized nations. Asthma rates have increased by 50% in each decade for the last 40 years, and more than 300 million people worldwide now have asthma, while an additional 400 million have allergies. Already at least 50 million people in the US have allergies, and asthma affects 1 in 14 American adults and nearly 10% of our children, making it the leading cause of school absences. The incidences of both respiratory conditions are increasing partly because pollution and pollen worsen as the thermostat rises. Rising temperatures also have resulted in earlier and longer pollen seasons. More potent allergens, such as the pollen in ragweed, are being produced in higher quantities because of warmer temperatures and because the air contains higher concentrations of carbon dioxide.

Huge dust storms like the ones that recently blanketed Arizona, northern China, Australia, and other arid areas are also responsible for spreading lethal epidemics around the world. The airborne dust cloud can carry viruses like influenza or severe acute respiratory syndrome (SARS) and other potentially harmful bacteria, viruses, and fungal spores over thousands of miles. Storms across the Sahara Desert have been blamed for the spread of fungal meningitis spores, which infect more than 250,000 people a year. Domestically, higher temperatures and more intense storms are linked to coccidioidomycosis—Valley Fever—a sometimes fatal disease infecting >200,000 Americans annually that is contracted by breathing in a fungus found in soil in the southwest USA, Central America, and South America. In the past decade, the incidence of this illness has quadrupled in the drought-stricken Southwest.

Sociological trends also will exacerbate the spread of disease as the planet heats up. The drought-driven economic collapse occurring in many rural farming communities in developing countries has escalated migration to the world’s megacities. The urban shanty towns that sprout up on the fringes of these giant metropolises tend to be filthy and overcrowded, making them breeding grounds for contagions. Increased global traffic has stepped up the transmission of tropical infectious diseases to
industrialized nations. The speed with which SARS spread from pig farms in rural China to North America is just one example of how epidemics go global.

And then there is the psychological fallout of living through more frequent natural disasters—the breakdown in social cohesion, the lost income, debt, and property damage—that can spill over into mental health problems such as anxiety, depression, posttraumatic stress disorder, substance abuse, domestic violence, and suicide. These repeated natural disasters could lead to the collapse of our normally well functioning public health system. Katrina-like flooding, for example, stresses the health system to the breaking point where basic sanitation, uncontaminated food or water, and the ability to control communicable diseases disappear.

We must all drive less, fly less, eat less, consume less, and pollute less, and we must do it quickly or there will be less people to talk about it. There is much each of us can do now. An unhealthy planet means unhealthy people.

William Clifford Roberts, MD
6 November 2013


Reader comments

Inadequate surgical education

Dear Dr. Roberts:

I always look forward to “Facts and Ideas from Anywhere.” Since “anywhere” encompasses operating theaters around the world, I thought that you would be interested in the attached paper from the recent edition of *Annals of Surgery* (1).

I have been involved in surgical education for my entire professional career. I have worked with residents, given grand rounds, participated in seminars, and have even written two books on the traditional morbidity and mortality conference. Over that time frame, classical surgical education (as have all medical specialties) has slowly suffered from the intrusion of unstoppable social and political forces. Medical education is accommodating those forces. Human pathology is not. So when respected leaders of education tell us that surgical graduates are unprepared for fellowships and for practice, one just has to stand up and take notice.

Here are the numbers from this publication:

1. 21% of the residents arriving for a fellowship were unprepared for the operating room.
2. 38% demonstrated a lack of patient ownership.
3. 30% could not independently perform a laparoscopic cholecystectomy.
4. 66% were unable to operate for more than 30 minutes unsupervised during a major procedure.
5. 30% could not atraumatically manipulate tissue laparoscopically.
6. 26% could not recognize anatomic planes.
7. 56% could not suture laparoscopically.
8. 28% were not familiar with therapeutic options.
9. 24% could not recognize the early signs of a complication. (This one particularly bothered me!)

Since many of us will be facing a surgical procedure in the future, I thought that I would call these facts and these ideas to your attention.

—Leo Gordon, MD, FACS
Los Angeles, California

Serum miR-200c is a novel prognostic and metastasis-predictive biomarker in patients with colorectal cancer

Toliam Y, Hur K, Tanaka K, Inoue Y, Kusunoki M, Boland CR, Goel A


Objectives: To evaluate the ability of epithelial-to-mesenchymal transition-related microRNAs (miRNAs) as serum biomarkers for prognosis and prediction of metastasis in patients with colorectal cancer (CRC).

Background: Epithelial-to-mesenchymal transition-related miRNAs drive CRC progression and metastasis. However, their potential as serum biomarkers in CRC has not been studied.

Methods: This was a 3-phase study using 446 colorectal specimens. In the first phase, we selected candidate miRNAs associated with metastasis by analyzing the expression of 4 miR-200 family members (miR-200b, -200c, -141, and -429) in serum samples from 12 patients with stage I and IV CRC. The second phase involved independent validation of candidate miRNAs in serum from 182 patients with CRC and 24 controls. Finally, we analyzed expression in matched 156 tumor tissues from 182 patients with CRC and an independent set of 20 matched primary CRC and corresponding liver metastases to identify the source of circulating miRNAs.

Results: After initial screening, miR-200c was selected as the candidate serum miRNA best associated with metastasis. Validation analysis revealed that serum miR-200c levels were significantly higher in stage IV than in stage I–III CRCs. High serum miR-200c demonstrated a significant positive correlation with lymph node metastasis, distant metastasis, and prognosis (P = 0.0026, P = 0.0023, and P = 0.0064, respectively). More importantly, serum miR-200c was an independent predictor for lymph node metastasis (odds ratio: 4.81, 95% confidence interval: 1.98–11.7, P = 0.0005) and tumor recurrence (hazard ratio: 4.51, 95% confidence interval: 1.56–13.01, P = 0.005) and emerged as an independent prognostic marker for CRC (hazard ratio: 2.67, 95% confidence interval: 1.28–5.67, P = 0.01).

Conclusions: Serum miR-200c has strong potential to serve as a noninvasive biomarker for CRC prognosis and predicting metastasis.

Risk of not being discharged home after isolated coronary artery bypass graft operations


Background: The age and risk profile of patients undergoing isolated coronary artery bypass grafting (CABG) is increasing, which will likely increase the proportion of CABG patients discharged to nursing homes, rehabilitation, or long-term care. Because discharge disposition can be important to a patient’s treatment goals, developing and using predictive tools will improve informed treatment decision making. We examined the utility of The Society of Thoracic Surgeons (STS) risk of mortality score in predicting discharge disposition after CABG.

Methods: From January 1, 2004, to October 31, 2011, 5119 patients underwent isolated CABG at The Heart Hospital Baylor Plano or Baylor University Medical Center (Texas) and were discharged alive. The association between STS risk of mortality and discharge to nursing home, rehabilitation, or long-term care was assessed using multivariable logistic regression, adjusted for age, body surface area, marital status, site, and year of operation.

Results: At discharge, 216 patients (4.21%) went to nursing homes, 153 (2.99%) to rehabilitation, and 115 (2.25%) to long-term care. The STS risk of mortality score was significantly positively associated with discharge status (P < 0.001). Patients with 1%, 2%, 3%, 4%, and 5% STS risk of mortality had 11.25%, 22.10%, 29.45%, 35.00%, and 38.50% probability, respectively, of not being discharged home. When the STS risk of mortality was 5%, the risk of not being discharged home was 47.9% for off-pump patients and 38.10% for on-pump patients.

Conclusions: STS risk score is strongly associated with CABG discharge status. Patients with a risk score exceeding 2 are at high risk (>22%) of not being discharged home. This risk should be discussed when treatment decisions are being made.

Which is better: a miniaturized percutaneous ventricular assist device or extracorporeal membrane oxygenation for patients with cardiogenic shock?

Chamogeorgakis T, Rafael A, Shafii AE, Nagpal D, Pokersnik JA, Gonzalez-Stawinski G


The purpose of this study is to compare outcomes associated with the use of Impella and TandemHeart short-term support devices with venoarterial extracorporeal membrane oxygenation (ECMO) therapy for postinfarction- or decompensated cardiomyopathy-related cardiogenic shock. Between January 2006 and September 2011, 79 patients were supported with either an Impella axial flow pump (n = 7) or a TandemHeart centrifugal pump (n = 11), or with ECMO (n = 61) therapy for cardiogenic shock in a single institution. Pertinent variables and postprocedural events were analyzed in this cohort of patients using a prospectively maintained clinical database. The in-hospital mortality, successful weaning from mechanical circulatory support, bridge to long-term destination support device and heart transplantation, and limb complications did not differ between the 2 groups based on intention-to-treat analysis. Age was the only independent predictor for in-hospital survival. In this cohort of patients,
short-term support devices and ECMO achieved comparable results. In the modern era of medical cost restraints, ECMO may be more cost effective for patients with postinfarction- or decompensated cardiomyopathy-related cardiogenic shock. Larger randomized trials may be necessary to further elucidate this topic.

**CELLULAR IMMUNOLOGY**

CD11b+ cells in donor-specific transfusion prolonged allogenic skin graft survival through indoleamine 2,3-dioxygenase

Ikemoto T, Takita M, Levy MF, Shimada M, Naziruddin B


The aim of this study is to show the effect of donor-specific transfusion (DST) in inducing immunological tolerance mediated by regulatory T cells (Treg) and indoleamine 2,3-dioxygenase (IDO). Skin grafts from H2(d) Balb/c were transplanted into H2(k) C3H/He 7 days after the infusion of donor splenocytes, isolated each immune cell populations. Graft survival prolonged in recipients who received splenocytes, MHC class II+ CD11b+ and CD3+CD19+ (P < 0.001, \( P < 0.05 \), and \( P < 0.01 \), respectively). CD11b+ cell infusion resulted in prolongation of graft survival when compared to CD11c+ cell infusion (\( P < 0.01 \)). Foxp3+CD4+CD25+ T cells were increased after the transplant in recipients infused with CD11b+ cells (\( P < 0.05 \)). The mixed lymphocyte reaction showed donor-specificity (\( P < 0.001 \)). High IDO expression was observed in CD11b+ cell infusion group. Graft survival with DST using IDO antagonist (1MT) were not prolonged. In conclusion, DST allows induction of donor-specific tolerance which involves Foxp3+CD4+CD25+ T cells and IDO expression.

**CLINICAL TRANSPLANTATION**

Multicenter review of liver transplant for hepatitis B-related liver disease: disparities in gender and ethnicity


*Clin Transplant* 2013 Sep 3 [Epub ahead of print]. Reprinted with permission from John Wiley and Sons.

Orthotopic liver transplantation (OLT) is the preferred treatment for selected patients with hepatitis B virus (HBV)-related liver disease. This study aimed (i) to define long-term outcomes following OLT for HBV; (ii) to quantify the incidence of HBV recurrence (rHBV) as it relates to anti-HBV treatment; and (iii) to determine outcomes for specific patient subgroups. We performed a retrospective chart review of 738 patients undergoing OLT between 1985 and 2010 at seven US transplant centers and divided the patients into 3 eras, 1985–1994, 1995–2004, and 2005–2010, based on hepatitis B immunoglobulin and antiviral therapies. In Era 3, female gender (\( P = 0.002 \)), recurrent hepatocellular cancer (\( P < 0.001 \)), and retransplantation (\( P = 0.01 \)) were significantly associated with worse survival on multivariate analysis. Survival at 3 yr was poor for all ethnicities in Era 1, but significantly improved for all except black Americans by Era 3. Era 2 data showed a continued increase in rHBV from 5 to 10 yr (16.6%, 26.2%). In conclusion, while OLT outcomes have improved because of combination antiviral and immunoglobulin therapy, women and black Americans may not have realized an equal benefit. The rate of rHBV is significant even 10 yr post-transplant with survival affected.

**FOOT AND ANKLE INTERNATIONAL**

Radiographic and clinical outcomes of joint-preserving procedures for hallux valgus in rheumatoid arthritis

Chao JC, Charlick D, Tocci S, Brodsky JW


Background: The standard treatment for hallux valgus in rheumatoid arthritis has been arthrodesis of the first metatarsophalangeal (MTP) joint. There is limited literature regarding the results of hallux valgus procedures which preserve the first MTP joint in rheumatoid patients. We investigated the radiographic and clinical outcomes of joint-preserving surgery for hallux valgus in a series of rheumatoid patients to evaluate the result of nonarthrodesis reconstruction.

Methods: Thirty-seven feet with hallux valgus in 27 patients with RA treated with a joint-preserving procedure of the first MTP joint were analyzed radiographically and clinically. Average follow-up was 42 months (range, 12–111 months). Twenty feet had Ludloff osteotomies, 15 had scarf osteotomies, and 2 had chevron osteotomies. Radiographs were evaluated preoperatively and postoperatively for hallux valgus angle, 1–2 intermetatarsal angle, and degenerative narrowing of the first MTP joint based on the Sharp score and the Larsen grade. Narrowing of the first
interphalangeal (IP) joint was based on a modification of the classification of Hartrup and Johnson. Operative complications and required secondary surgeries were tabulated. Clinical outcomes were measured using preoperative and postoperative Short Form-36 (SF-36), AOFAS forefoot scale, and Visual Analogue Scale (VAS) pain questionnaires.

Results: The average hallux valgus angle improved from 37 degrees preoperatively to 15 degrees postoperatively. The average 1–2 intermetatarsal angle improved from 14 degrees preoperatively to 5 degrees postoperatively. The average Sharp score of the first MTP joint was 0.9 preoperatively and 1.6 postoperatively. The average Larsen grade of the first MTP joint was 0.6 preoperatively and 1.4 postoperatively. Range of motion of the first MTP joint was essentially unchanged between preoperative and postoperative measurements. Seven of 37 feet had progression of first IP joint space narrowing, but none were symptomatic. The AOFAS score improved from 45.2 preoperatively to 82.6 at final follow-up (P < .01). The VAS decreased from 4.8 preoperatively to 1.5 at final follow-up (P < .02). The SF-36 physical component score decreased from 40.3 preoperatively to 37.4 at final follow-up, and the mental component score remained unchanged, and neither was statistically significant. There were 7 feet (19%) that required a return to surgery: 3 wound infections, 2 arthrodeses for progression of deformity, and 1 each for revision for recurrence and hardware removal.

Conclusion: Rheumatoid arthritis patients who undergo a bunionectomy rather than arthrodesis to preserve the first MTP joint have satisfactory clinical and radiographic outcomes. This procedure appeared to be a reasonable alternative to first MTP arthrodesis in patients with relatively preserved joints.

Level of evidence: Level IV, retrospective case series.

JOURNAL OF CLINICAL ETHICS

The intensity and frequency of moral distress among different healthcare disciplines


Introduction: The objectives of this study are to assess and compare differences in the intensity, frequency, and overall severity of moral distress among a diverse group of healthcare professionals.

Methods: Participants from within Baylor Health Care System completed an online seven-point Likert scale (range, 0 to 6) moral distress survey containing nine core clinical scenarios and additional scenarios specific to each participant’s discipline. Higher scores reflected greater intensity and/or frequency of moral distress.

Results: More than 2,700 healthcare professionals responded to the survey (response rate 18.14%); survey respondents represented multiple healthcare disciplines across a variety of settings in a single healthcare system. Intensity of moral distress was high in all disciplines, although the causes of highest intensity varied by discipline. Mean moral distress intensity for the nine core scenarios was higher among physicians than nurses, but the mean moral distress frequency was higher among nurses. Taking into account both intensity and frequency, the difference in mean moral distress score was statistically significant among the various disciplines. Using post hoc analysis, differences were greatest between nurses and therapists.

Conclusions: Moral distress has previously been described as a phenomenon predominantly among nursing professionals. This first-of-its-kind multidisciplinary study of moral distress suggests the phenomenon is significant across multiple professional healthcare disciplines. Healthcare professionals should be sensitive to situations that create moral distress for colleagues from other disciplines. Policy makers and administrators should explore options to lessen moral distress and professional burnout that frequently accompanies it.

JOURNAL OF TRAUMA AND ACUTE CARE SURGERY

Does caring for trauma patients lead to psychological stress in surgeons?

Warren AM, Jones AL, Shafi S, Roden-Foreman K, Bennett MM, Foreman ML

Background: Symptoms identical to posttraumatic stress disorder (PTSD) have been shown to occur in caregivers of trauma patients. Secondary traumatic stress (STS) characterizes those who exhibit PTSD symptoms related to indirect exposure to a stressor. We hypothesized that caring for trauma patients is associated with symptoms of PTSD/STS.

Methods: Surgeons in various specialties (n = 133) were surveyed from January to May 2012 at two regional surgical conferences. Symptoms of PTSD were identified using the Secondary Traumatic Stress Scale (STSS) using specific diagnostic criteria to measure the psychological impact of exposure to trauma patients. Resilience was measured using the Connor-Davidson Resilience Scale 10 items. The amount of time caring for trauma patients was used as a measure of risk exposure. The relationship between STSS, resilience, and exposure to trauma patients was measured with $P < 0.05$ considered significant.

Results: Twenty-eight surgeons (22%) met diagnostic symptom criteria for PTSD as measured by the STSS. Approximately two thirds of the surgeons (86 of 133, 65%) exhibited at least one symptom of STS. However, the magnitude of exposure to trauma patients was similar between surgeons with and without PTSD symptoms ($P = 0.2177$). Higher resilience scores were associated with lower STS scores ($r = -0.369$, $P < 0.0001$). Most importantly, surgeons who met symptom criteria for PTSD exhibited significantly lower resilience scores (31 [3.4] vs. 34 [3.9], $P < 0.0001$).

Conclusion: Symptoms of PTSD as measured by the STSS were reported in two thirds of study participants but did not correlate with time spent for caring for trauma patients. One in five reported symptoms consistent with a PTSD. Lower resilience scores correlated with risk of symptoms and may be used to identify those surgeons most at risk. Efforts to better identify, address, and moderate these psychological consequences of surgical care may improve both the emotional well-being and the vocational performance of surgeons.

**MAYO CLINIC PROCEEDINGS**

Immediate open repair vs surveillance in patients with small abdominal aortic aneurysms: survival differences by aneurysm size


Objective: To assess whether survival differences exist between patients undergoing immediate open repair vs surveillance with selective repair for 4.0- to 5.4-cm abdominal aortic aneurysms (AAAs) and whether these differences vary by diameter, within sexes, or overall.

Patients and methods: The study cohort included 2226 patients randomized to immediate repair or surveillance for the UK Small Aneurysm Trial (September 1, 1991, through July 31, 1998; follow-up, 2.6–6.9 years) or the Aneurysm Detection and Management trial (August 1, 1992, through July 31, 2000; follow-up, 3.5–8.0 years).

Survival differences were assessed with proportional hazard models, adjusted for a comprehensive array of clinical and nonclinical risk factors. Interaction between treatment and AAA size was added to the model to assess whether the effect of immediate open repair vs surveillance varied by AAA size.

Results: The adjusted analysis revealed no statistically significant survival difference between immediate open repair and surveillance patients (hazard ratio [HR], 0.99; 95% CI, 0.83–1.18; mean follow-up time, 1921 days for both study groups). This lack of treatment effect persisted when men (HR, 1.01; 95% CI, 0.84–1.21) and women (HR, 0.96; 95% CI, 0.49–1.86) were examined separately and did not vary by AAA size ($P = .39$ for the entire cohort and $P = .24$ for women).

Conclusion: Immediate open repair offered no significant survival benefit, even in patients with the largest AAAs and highest risk of rupture. Because recent trials failed to find a survival benefit of immediate endovascular repair over surveillance for small asymptomatic AAAs, our findings suggest that the gray area of first-line management for these patients should be resolved in favor of surveillance.

**NUTRITION IN CLINICAL PRACTICE**

Improving patient outcomes through registered dietitian order writing

Roberts SR


Traditionally, registered dietitians (RD) have not had order writing privileges in most patient-care facilities and rely on physicians to implement their recommendations. Research has demonstrated that this model results in a high percentage of RD recommendations not being ordered. Timely nutrition interventions are important due to the prevalence of malnutrition in the hospital setting and when RD recommendations are implemented, important outcomes are improved. In addition, several studies have demonstrated that when RDs have order writing privileges, which allows more assurance that an intervention will occur and timely interventions, improved outcomes, such as improved nutrition status, better management of electrolytes and glycemic control, reaching goal calories sooner, reduction in inappropriate parenteral nutrition use, cost savings, and less error with electronic order entry. The process for implementation and outcomes of an RD order writing program at 1 large, urban, tertiary medical center is described. The program has been successful, but the implementation process required multiple years and ongoing monitoring through data collection to ensure success. RDs interested in order writing privileges must consider federal and state regulations, their individual scope of practice (relevant training and competency assessment), and how to obtain approval from the appropriate hospital governing committees. RDs who obtain order writing privileges must understand “with privilege comes responsibility” and should plan to conduct outcomes research to promote the value and acceptance of RD order writing by regulatory agencies at all levels and hospital leaders, for instance physicians and administrators.

If you are a Baylor researcher and would like your published abstract to be included in this section, please e-mail the PubMed citation to Cynthia. Orticio@BaylorHealth.edu.
Infective endocarditis superimposed on a massively calcified severely stenotic congenitally bicuspid aortic valve
S. Sarmast, J. M. Schussler, J. M. Ko, and W. C. Roberts

Group beating in a 69-year-old man with a previous silent myocardial infarct
D. L. Glancy and V. N. Lathia

Irregular cardiac rhythm with combined rheumatic mitral stenosis and aortic stenosis
D. L. Glancy and T. G. Gaines

Energy and macronutrient intake of a female vegan cyclist during an 8-day mountain bike stage race
K. C. Wirnitzer and E. Kornexl

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Tributes to Marvin J. Stone, MD, on his retirement
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S. D. Phillips and W. C. Roberts

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Invited commentary: Role of alpha-2 agonists for postoperative pain relief
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Sedation levels during propofol administration for outpatient colonoscopies

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L. Zehetner, B. Cooper, and J. R. Krause

Smooth muscle neoplasms of the vulva masquerading as Bartholin gland duct cysts
R. A. Levy, W. M. Whitham, C. S. Bryant, and C. M. Quick

Multicentric Castleman’s disease and HIV
J. R. Krause, S. D. Robinson, and E. A. Vance

Disseminated Kaposi’s sarcoma without cutaneous involvement
B. Shepard, D. Tompkins, D. Baker, and J. Stroup

Mucocele of the appendix
T. H. Louis and D. F. Felter

Laryngeal actinomycosis
F. Lensing, T. Abele, R. Wiggins III, and E. Quigley

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