MEDICAL COLLEGE OF WISCONSIN
**DEPARTMENT OF SURGERY**

SURGERY UPDATE
# LEADING THE WAY

FEBRUARY 2012 • VOLUME 4, NUMBER 1

MEDICAL COLLEGE OF WISCONSIN

Department of Surgery
*Dedicated to Clinical Care, Research and Education*

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## From the Chairman

**DOUGLAS B. EVANS, MD**
Chairman, Department of Surgery, Medical College of Wisconsin
Donald C. Ausman Family Foundation Professor of Surgery

**PHILIP REDLICH, MD, PhD**
Chief, Division of Education, Department of Surgery, Medical College of Wisconsin
Gerald L. Schmitz, MD, Professor of Surgery

The Department of Surgery is pleased to announce the election of Travis P. Webb, MD (pictured at left) to The Medical College of Wisconsin's Society of Teaching Scholars. This honor is in recognition of his sustained educational commitment in multiple areas, including educational scholarship, leadership, and excellence in teaching. Dr. Webb has served in many educational roles at MCW and within the Department of Surgery. As co-clerkship director, he oversees the trauma surgery portion of the Resuscitation and Perioperative Medicine (RPM) clerkship for third-year medical students. He also directs the PGY-2 Protected Block Curriculum and serves as one of the Associate Program Directors for the General Surgery Residency Program. Dr. Webb has published numerous articles on the educational training of medical students and surgical residents, and has participated in continuing medical education courses for faculty and visiting surgeons. He combines the highest level of dedication to our mission of education with a passion for clinical surgery and academic achievement.

Founded at The Medical College of Wisconsin in 1990, the Society of Teaching Scholars was one of the first service-oriented honorary academies for education in the United States. It was established to stimulate innovation in medical education and reward excellence in education by our faculty. The MCW Society of Teaching Scholars elects up to five members each year and currently has 51 active members selected from the 1,200 full-time faculty comprising 25 clinical specialties at MCW. With less than 5% of the full-time faculty elected to the Society, Dr. Webb continues a tradition of excellence among surgical educators, as he is now the fifth Department of Surgery faculty member inducted into the Society, joining Karen Brasel, MD, MPH; Philip Redlich, MD, PhD; John A. Weigelt, MD, DVM; and Stuart Wilson, MD. Congratulations Dr. Webb! •

**IN THIS ISSUE:**

# Fertility Preservation Counseling is Necessary Prior of Medical and Surgical Therapies that May Com

**ESTIL YOUNG STRAWN, JR., MD**
Chief of Reproductive Endocrinology and Infertility
Professor, Obstetrics and Gynecology

The surgical and medical treatments for cancer as well as a wide variety of other systemic diseases, including certain autoimmune disorders, have the potential to significantly impair or eliminate the possibility for natural fertility in men and women. This may occur as a result of the administration of medications that are toxic to the gonads or the need to remove some or all of the organs necessary for natural reproduction. While the primary focus of persons with cancer or serious non-malignant diseases often is surviving their disease process with a reasonable quality of life, due to significant improvements in medicine, many survivors ultimately would like to become parents.

Cancer primarily affects older individuals. However, nearly 10% of patients diagnosed with cancer are below 45 years of age. Of particular importance is that the most frequent site of these cancers is in the reproductive organs (uterine cervix, uterine corpus, ovaries, and testis) and breasts (in women). The overall 10-year survival rate for all cancers has improved over the past several decades. For patients diagnosed with all cancers between 1996 and 1998, the 10-year survival rate was 76.62% for women and 66.23% for men. The annual mortality related to all malignancies has fallen from 28.04 per 100,000 from 1978–1987 to 19.71 per 100,000 from 2000–2007.

Due to significant improvements in survival and quality of life, many of these patients still wish to have their own biological children. These same studies also show that the inability to have their own biological children not only will lead to depression and a loss of identity, but potentially to anger and a sense of injustice if the patient determines they were not offered adequate counseling about their fertility options prior to the initiation of therapy.[1]

For post-pubertal males, the techniques for cryopreservation (e.g., freezing) of sperm, or in some circumstances, testicular tissue, are well established, reproducible, and lead to acceptable pregnancy rates through intrauterine insemination (10–20% pregnancy rate per menstrual cycle) or *in vitro* fertilization (40% delivery rate per embryo transfer for women less than 35 years of age). The options for pre-pubertal males remain investigational and are not yet appropriate for general use. In the peri-pubertal male, counseling of both the patient and the parents is extremely important. Since it is difficult to ascertain the exact onset of full spermatogenesis, many of these adolescents may have mature sperm in their testes prior to onset of ejaculation. Surgical retrieval, via open or percutaneous methods, often is possible, and can be combined with other procedures, such as Mediport placement. Therefore, consultation with male fertility specialists, in conjunction with the oncology team, is advisable.

For pre-pubertal females, the options are laparoscopic excision of a portion of the ovary or removal of the ovary, followed by cryopreservation and later re-implantation of the tissue once the patient is disease free. These techniques, often referred to as "ovarian tissue banking," still are considered investigational and should be offered in settings where there is institutional review board oversight.

There are multiple options, some of which remain investigational, and others being well established, with acceptable pregnancy rates per procedural attempt for post-pubertal and adult females.

Ovarian tissue banking procedures for the post-pubertal and adult female are the same as for the pre-pubertal female. Relative contraindications for consideration of these procedures are diagnoses with a high likelihood for tumor spread to the ovaries through hematogenous, or lymphatic spread, such as leukemia or actual malignant process in the ovary. While these techniques have garnered significant interest in the scientific and lay community, the actual numbers of live births following re-implantation of ovarian tissue is considerably smaller compared to the techniques discussed below.

Oocyte vitrification is a process of rapid freezing of oocytes, which over the past two decades, has become a reproducible technology that, in certain cases, offers pregnancy rates comparable to those seen with *in vitro* fertilization. The same relative contraindications remain for this technique as for "ovarian tissue banking." Typically, these patients undergo some form of ovulation induction to stimulate the production of multiple ovarian follicles. The most commonly used agents include aromatase inhibitors such as letrozole and/or injectable gonadotropins. Following ovulation induction, patients undergo transvaginal ultrasound guided oocyte retrieval under monitored anesthetic care and the oocytes are vitrified. Once the patient is disease-free, these oocytes can be thawed and fertilized through intracytoplasmic sperm injection (ICSI) and one to two embryos can be placed in the uterus of the patient.[2,3] Typical delivery rates per attempt following oocyte vitrification, subsequent fertilization and embryo placement, or embryo cryopreservation and subsequent embryo thaw and placement are 20–40%.

*In vitro* fertilization is different from the oocyte vitrification process in that embryos are created within 24 hours of egg retrieval, and these embryos are cryopreserved. The cryopreserved embryos can be placed once the patient is confirmed to be disease free. The potential downside of the creation of embryos followed by cryopreservation rest in the disposition

# r to the Initiation promise Future Fertility

of those embryos in the event the patient does not survive her disease process. Additionally, the idea of embryo creation may be problematic if the patient has no partner or does not have a partner willing to accept the responsibility of cryopreserved embryos.

The final part of any counseling for patients seeking a consultation about their options for having a family following treatment and survival of their disease process is a discussion about their options in the event their fertility cannot be preserved. For males, the option of using donor sperm has been long established, safe, and relatively inexpensive when compared to other forms of assisted reproduction. For females, their options include the use of donated oocytes, donated embryos, and gestational carriers. Both males and females should be made aware of the options of adoption and foster care as well. Women who do not lose ovarian function following completion of their therapy should be advised to consider attempting pregnancy earlier in life, as their ovarian function may be lost at a younger age compared to females that have not undergone chemotherapy, radiation, or surgical procedures impacting the ovaries.

While it is clear there are several types of options for fertility preservation in both males and females, it is concerning that in several studies of oncologists, their rates of counseling or referral for counseling remain disturbingly low. The previously described technologies are readily available at The Medical College of Wisconsin as well as many other academic and private-sector fertility clinics.[4] Many of these clinics can serve as counseling and treatment options for these patients as well. The patients will be best served if they receive their counseling prior to initiation of any medical or surgical treatment of their disease. •

**FOR ADDITIONAL INFORMATION** on this topic, see references, visit mcw.edu/surgery, or contact Dr. Strawn at 414-805-6612, or estrawn@mcw.edu.

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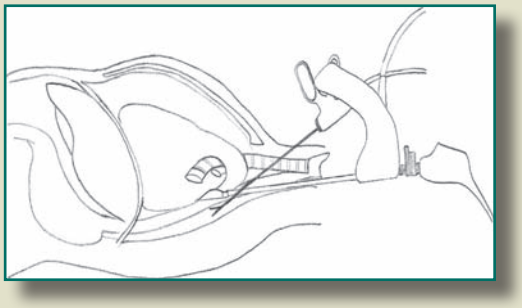
## Medical College Surgeons Leading the Way in Surgical Technique



The transhiatal esophagectomy has been a standard surgical treatment for esophageal cancer since it was popularized in the 1970s. Nevertheless, the technique is limited by blunt dissection that results in risk of bleeding and the inability to achieve a thoracic lymphadenectomy. At the most recent meeting of the Wisconsin Surgical Society in Kohler, WI, Dr. Bill Tisol of the Division of Thoracic Surgery at The Medical College of Wisconsin presented a new technique for esophageal mobilization and thoracic lymphadenectomy. This technique, called Transcervical Endoscopic Esophageal Mobilization (TEEM), allows the surgeon to mobilize the esophagus through a small neck incision under direct vision. Blood vessels supplying the esophagus are ligated and divided, thus reducing blood loss. Lymph nodes can also be biopsied, which contributes to the patient's cancer staging. Additionally, operative times are reduced using this new technique. Learn more about this operative advancement for esophageal cancer in an upcoming issue of *Leading the Way.* •

**FOR ADDITIONAL INFORMATION** on this topic, contact Dr. Tisol at 414-955-6904; wtisol@mcw.edu

Illustration provided with kind permission from Springer Science+Business Media: *Surgical Endoscopy*, Mediastinoscope-assisted transhiatal esophagectomy for esophageal cancer, Volume 18, 2004, Page 2, A. Tangoku, Figure 2.

# Low Anterior Resection Syndrome and Translational Research

**KIRK A. LUDWIG, MD**
Chief, Division of Colorectal Surgery
Vernon O. Underwood Chair in Surgery

In the last few decades, remarkable progress has been made in the treatment of rectal cancer. Based on multiple factors, including total mesorectal excision, the majority of rectal cancer patients, even those with tumors in the distal rectum, now can be managed with sphincter-sparing resection. There still is a place for abdominal perineal resection in the treatment of distal tumors where local invasion makes preservation of the sphincters and anus impossible. However, the new gold standard operation has become the low anterior resection, performed according to the principles of total mesorectal excision with a coloanal anastomosis at or below the anorectal ring.

Unfortunately, replacing the rectum with a segment of the left colon does produce disordered bowel function, commonly termed the "low anterior resection syndrome." Symptoms include urgency, frequency, clustering of bowel movements, and at times, incontinence. For the busy rectal cancer surgeon, managing this bowel dysfunction, which affects nearly all low anterior resection patients to a certain degree, becomes a daily part of practice. A number of studies demonstrate that reconstruction with a colonic pouch tends to produce better function than a straight coloanal anastomosis, symptoms tend to improve over time, and ultimately, approximately 80% of patients have good or excellent bowel function. However, despite the passage of time and the reconstructive technique utilized, there still are issues. We saw this as a colon motility problem, and since the Division of Colorectal Surgery at The Medical College of Wisconsin has a basic science lab that focuses on GI motility, we exercised the opportunity to take the clinical problem from the bedside to the bench with the hope of bringing solutions back to the bedside through translational research.

From a basic physiologic standpoint, trying to understand what causes low anterior resection has become a major area of focus in our basic science lab. In the operating room, we observed that after the complete mobilization and division of the bowel required as part of a low anterior resection (in preparation for a coloanal anastomosis), there are very strong contractions that randomly occur in the distal transverse and descending colon that never start, or progress into the mid- or proximal transverse colon. As we watched these contractions and listened to our patients describe their postoperative bowel function, it occurred to us that what we saw in the operating room was causing the disordered bowel function. We hypothesized that the disordered bowel function (low anterior resection syndrome) is a result of motility changes seen in the left colon following extrinsic denervation that occurs with the extensive mobilization performed during these operations.

Taking this to the lab, and using a rat model, we were able to show that surgical denervation of the left colon, as occurs with low anterior resection, results in a significant increase in motility. Pharmacologically, this appears to be the result of destruction of an inhibitory-sympathetic pathway.[1] This increased motility may contribute to low anterior resection syndrome. Subsequent studies concentrating on the pelvic nerves have shown that damage to the extrinsic sympathetic and parasympathetic pelvic nerves causes acute changes in large bowel motor function that normalize over time, implicating a compensatory mechanism within the bowel wall itself.[2] An understanding of the mechanism responsible for the adaptation that takes place after extrinsic denervation is a question to be addressed. Our most recent study suggests it is upregulation of mucosal 5-HT3 receptors.[3] We think this also occurs in humans, and may, in large part, explain why low anterior resection syndrome symptoms improve with time.

We are getting close to being able to test some of our ideas clinically. Hopefully, we can then better understand the mechanisms responsible for low anterior resection syndrome and ways to avoid this problem. Given that low anterior resection syndrome often occurs after sphincter-sparing resection with coloanal anatsomosis, we hope to learn how we can treat it more effectively, perhaps from a pharmacologic standpoint, based on what we discover regarding its etiology. Until then, we are left with our current treatment approach. This includes reconstruction with a colonic pouch, use of anti-diarrheal medications to slow GI transit and help in solidifying bowel movements, and the use of anti-cholinergic medications to reduce the spasticity of the left colon and neorectum. •

**FOR ADDITIONAL INFORMATION** on this topic and any aspect of rectal cancer, contact Dr. Ludwig at 414-805-5783 or kludwig@mcw.edu.

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# Hepatectomy for Noncolorectal Nonneuroendocrine Metastatic Cancer: A Multi-Institutional Analysis

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**T. CLARK GAMBLIN, MD, MS**
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Stuart D. Wilson Chair in Surgery

The liver is a predominant site of metastasis for malignancies. Metastatic colorectal cancer is the most common entity, with the portal circulation and lymphatic channels acting as the conduit for spread. Better understanding of tumor biology, improved techniques for liver resection, and multidisciplinary treatments have led to new algorithms for managing metastatic disease in the liver. For selected patients, surgical resection of colorectal liver metastases has shown five-year survival rates as high as 40% to 71%.[1] Recent publications also have suggested that hepatectomy for noncolorectal nonneuroendocrine liver metastases (NCNNLM) is feasible and safe.[2] Our objective was to assess the safety and outcomes of patients undergoing liver resection for NCNNLM at high-volume hepatobiliary centers.

We examined 420 consecutive patients who underwent liver resection between 1990 and 2009 for NCNNLM at four major hepatobiliary centers in the United States (Duke University Medical Center, Durham, NC; Johns Hopkins Hospital, Baltimore, MD; M.D. Anderson Cancer Center, Houston, TX; University of Pittsburgh Medical Center, Pittsburgh, PA). Patients with direct hepatic invasion by an extrahepatic primary tumor were excluded from analysis. Patients were evaluated by a multidisciplinary team and preoperative and/or postoperative systemic therapy was considered uniformly. Patients who showed progression of disease during preoperative systemic therapy typically were not offered resection.

| Tumor Type | n | % |
|---|---|---|
| Breast | 115 | 27.4 |
| Sarcoma | 98 | 23.3 |
| Genitourinary | 92 | 21.9 |
| Melanoma | 31 | 7.4 |
| Other | 84 | 20.0 |

**Table 1:** Frequency of tumor types for patients undergoing hepatic metastesectomy

There were 101 hepatectomies performed between 1990 and 1999, and 319 hepatectomies performed between 2000 and 2009. Frequencies of primary tumor types are shown in Table 1. Liver metastases were synchronous in 26.0% of patients, and unilateral in 70.0% of cases. Extrahepatic metastases were resected in 77 of 362 (21.3%) patients. R0 liver resections were achieved in 340 of 397 (85.6%) cases. Radiofrequency ablation was performed on additional resection of liver metastases in 36 of 339 (10.6%) cases. Only 13 cases were completed laparoscopically, while major hepatectomies (≥4 segments) were performed in 205 (48.8%) patients. In total, 326 patients were treated with chemotherapy: 275 (66.4%) received chemotherapy before hepatectomy, and 208 (52.0%) received chemotherapy after hepatectomy. Transarterial chemoembolization was performed preoperatively in one patient, and postoperatively in two patients. Radiation therapy was performed in 15 (3.7%) patients after hepatectomy.

Complications (Clavien grade II or higher) occurred in 84 (20.0%) patients. Eight (1.9%) patients died within 60 days. Although sarcoma resections had the longest median survival (72 months), individual histology was not a predictor of survival ($p = 0.40$, Figure 1).

Univariate analysis showed that histopathologic lymphovascular invasion (LVI) was associated with a significant decrease in median survival, 52 (39–65) months for those without LVI compared to 25 (12–38) months for those with LVI ($p = 0.04$). Resection of metastases ≥5 cm had a median survival of 37 (29–46) months, whereas median survival for lesions <5 cm was 66 (46–86) months ($p = 0.002$). Trends toward improved survival were noted with the use of postoperative chemotherapy ($p = 0.1$) and achieving an R0 resection ($p = 0.1$), but these were not statistically significant. A multivariable analysis was performed controlling for age, synchronicity, number of metastases, margin status, and chemotherapy use. In this model, LVI (hazard ratio = 1.81, $p = 0.05$) and size ≥5 cm (hazard ratio = 1.39, $p = 0.04$) remained independent predictors of poorer survival.

Patients who underwent hepatectomy from 1990 to 1999 had a median survival of 32 months, whereas patients with resections from 2000 to 2009 had a median survival of 66 months ($p = 0.003$). The respective one-, three-, and five-year survivals were 61%, 39%, and 18% for those resections in the earlier decade, and 77%, 55%, and 38% in the latter decade. A *post hoc* univariate analysis was performed to study

**HEPATECTOMY** CONTINUED ON PAGE 6 >>

**HEPATECTOMY** CONTINUED FROM PAGE 5

this difference in survival. The only study parameter that was significantly different between the two decades was that mean operative blood loss was lower from 2000 to 2009 ($p = 0.01$).

Historically, there has been concern that hepatectomy is unwarranted for NCNNLM, but this notion has been challenged by several publications in the last two decades. Given the lack of data supporting other treatment modalities, the improved capabilities in preoperative workup, and the modern safety of liver surgery at tertiary centers, hepatectomy for NCNNLM is gaining enthusiasm. The median survival in this cohort was 49 months, which is the longest among the published series of more than 100 patients.

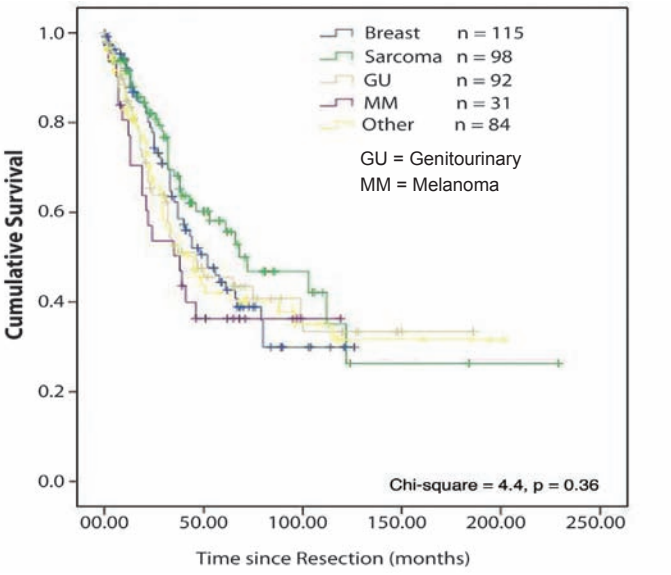


**FIGURE 1:** Overall survival of various tumor types following hepatic metastasectomy

In summary, NCNNLM represent an advanced stage of cancer that—when appropriately selected—can be resected safely and with reasonable survival outcomes. Hepatectomy should be considered as a tool within the broader scope of a multidisciplinary approach, especially for tumors <5 cm in size. Judicious use of chemotherapy in conjunction with surgery can further improve survival. In addition to the multiple prognostic factors that already have been identified in the literature, we found that microscopic evidence of LVI was associated with poorer outcomes. More investigation into this field is warranted to ascertain the comparative benefit of surgery, chemotherapy, chemoembolization, radiation, and other adjunct therapies. •

**FOR ADDITIONAL INFORMATION** on this topic, see references, visit mcw.edu/surgery,or contact Dr. Gamblin at 414-805-5020; tcgamblin@mcw.edu.

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Dr. Groeschl is the first HPB research fellow in the Division of Surgical Oncology and has completed his first three years of general surgery residency. He is focused on liver outcomes in addition to taking classes in statistics at The Medical College of Wisconsin during his two year research endeavor. The goal of the HPB research fellowship is to equip a trainee with the experience and skill set of liver and pancreas research and establish an early career trajectory in order to lead the field.

## Department of Surgery Welcomes Dr. Dunnington to Grand Rounds in February

The Department of Surgery and the MCW Society of Teaching Scholars welcome Gary Dunnington, MD to Milwaukee, February 21–22. Dr. Dunnington, Professor and Chair of the Division of Surgery at Southern Illinois University (SIU), is the founder and Director of the Breast Center at SIU. He also is widely known as a leader in surgical education. He has received a total of 12 teaching awards and was named Outstanding Faculty Teacher of the Year eight times at three institutions. Dr. Dunnington will present "Measuring and Improving Performance in Surgical Training" at the Department of Surgery Grand Rounds at 7:30 AM on February 22.

# Robot-Assisted Pancreatectomy
## *Evolution of a Historic Operation*


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Tumors of the head of the pancreas have long posed a formidable challenge to surgeons, and the 1925 description of a two-staged procedure presented opportunities for the development of the modern pancreaticoduodenectomy (Figure 1).

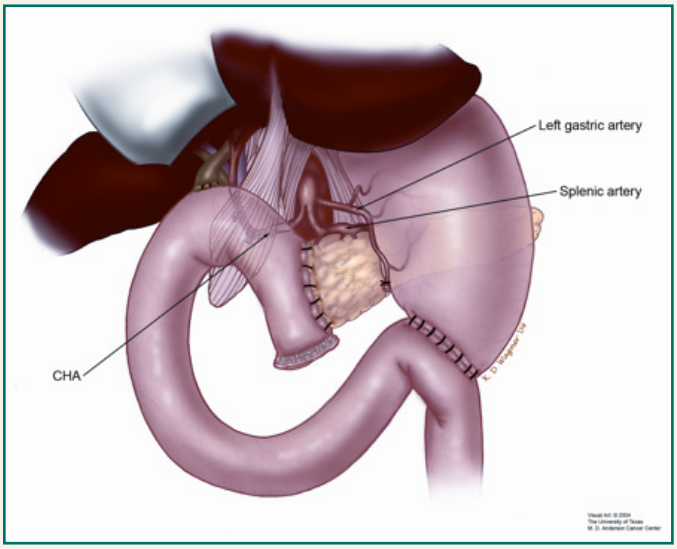


**Figure 1:** Reconstruction after modern pancreaticoduodenectomy
Courtesy of D. B. Evans, MD and his chapter in *Mastery of Surgery*.


**Figure 2:** da Vinci Si robot system currently used at The Medical College of Wisconsin

With the development of better anesthetic techniques, energy devices, and vascular techniques that facilitate concomitant vascular resection, the procedure has evolved considerably. The advent of laparoscopy and the ubiquitous application of this technology to surgery, led to attempts to apply this technique to the pancreaticoduodenectomy. Early reports of a totally laparoscopic pancreaticoduodenectomy came from the Mayo Clinic, Rochester and Gem Hospital, India.[1,2] However, widespread adoption of this technique was restricted due to poor surgeon ergonomics, limited range of mobility, and two-dimensional imaging leading to altered depth perception. This has led to the development of the robot-assisted pancreaticoduodenectomy where technology allows for better ergonomics with enhanced degrees of freedom, three-dimensional imaging, and the ability to perform rapid suturing, which is required for the complex reconstruction.

### Robotic Technology

Currently available robotic technology has gone through several iterations to provide surgeons with miniaturized, wristed instruments that replicate the surgeons' motions intra-corporeally. The ability of this technology to seamlessly translate the hand movements into precise movements with a scaling factor makes the application of this technology attractive to robotic

**PANCREATECTOMY** CONTINUED ON PAGE 8 >>


**Figure 3:** Suture ligation of the uncinate branches of the superior mesenteric artery and vein (foreground shows superior mesenteric vein with transected specimen on the left of the figure).

**PANCREATECTOMY** CONTINUED FROM PAGE 7

pancreatic surgery. Current robotic technology at The Medical College of Wisconsin uses a 3D camera with high-definition screens, and has three arms in addition to the camera that can be controlled independently by the operating surgeon (Figure 2). The incorporation of state-of-the-art technology into clinical practice offers patients benefits of laparoscopy, while avoiding the disadvantages.

### Robot-Assisted Pancreaticoduodenectomy

The steps involved in a robotic procedure include the following:

1. Laparoscopic Portion
   - Systematic exploration;
   - Limited catell-braasch maneuver;
   - Kocherization of the duodenum;
   - Antrectomy;
   - Jejunectomy with takedown of the ligament of treitz; and
   - Suturing the planned limb of the gastrojejunostomy to the stomach to facilitate robotic reconstruction.
2. Robotic Portion
   - Hilar dissection with lymphadenectomy and transection of the gastroduodenal artery and common bile duct;
   - Transection of the neck of the pancreas;
   - Dissection of the uncinate process and the superior mesenteric artery with ligation of the inferior pancreaticoduodenal artery (Figure 3);
   - Cholecystectomy;
   - Extraction of the specimen; and
   - Robotic reconstruction with duct to mucosa pancreaticojejunal anastomosis, hepaticojejunostomy and a stapled gastrojejunostomy.

### Potential Advantages of Minimally Invasive Pancreatic Surgery

The advantages of minimally invasive surgery first were demonstrated in general surgery by the advent of the laparoscopic cholecystectomy,[3] which demonstrated the reduced inflammation, pain, and incision size, and consequently, led to an earlier recovery and shorter length of stay. Several studies have yielded similar results in the field of gastrointestinal surgery. It is likely that benefits of minimally invasive surgery will apply to pancreaticoduodenectomy if the surgical outcomes are equivalent.

### Concerns of Minimally Invasive Pancreatic Surgery

One of the biggest concerns with all minimally invasive oncological surgeries is the equivalence to open operations, which has been demonstrated in colon cancer and is being evaluated in liver, rectal, and gastric cancers, among others. Minimally invasive robotic pancreaticoduodenectomy outcomes from the University of Pittsburgh reflect oncological equivalence in the resection rate, margin positivity, and node retrieval, with a pancreatic fistula rate of 20%, a rate comparable to open approaches.[4]

The application of robotic surgery to pancreatic head tumors requires a careful, programmatic approach with the involvement of two experienced pancreatic surgeons and a dedicated robotic team. Additionally, the costs and increased length of an operation must be justified by shorter length of stay and faster recovery, which have not been clearly demonstrated. Currently, only two large centers in the United States have published their experience with robotic pancreatic surgery, and the widespread adoption and maturation of this technique is essential before actual comparisons of the benefit of the approach can be made.

### Conclusions

The adoption of robotic technology has made minimally invasive pancreatic head surgery feasible. Early data provides a safety profile

similar to open surgery with similar oncological outcomes, although mature data is anticipated. Programmatic development of a robotic oncological surgery program is essential with careful monitoring of outcomes in the early adoption phase. •

**FOR ADDITIONAL INFORMATION** on robotic cancer surgery, contact Dr. Turaga at 414-805-5078 or kturaga@mcw.edu.

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# New ACGME Requirements: It's Not Just About the Hours!


**PAULA M. TERMUHLEN, MD**
General Surgery
Residency Program Director


In July 2011, the ACGME put new duty hour and supervision requirements into effect for all residents. The total 80-hour per week limit, 10 hours off between duty shifts, and one day off in seven were preserved. However, some of the most controversial and challenging new requirements were targeted at interns. Studies have suggested that the individuals with the least amount of experience were the ones most prone to making mistakes when fatigued. Thus, the ACGME felt compelled to modify the intern experience.

Now, interns can only work for a maximum of 16 hours and must be, at minimum, indirectly supervised, with a more senior resident or faculty immediately available to assist if needed.[1] Gone is overnight call or call on one's own if you are an intern! In fact, additional mandates require programs to verify that interns are ready for indirect supervision (i.e., that they can function without a supervisor in sight). In the Department of Surgery at Medical College of Wisconsin, the Division of Education took up this challenge to create a verification of competency program in which our current intern group participated as part of their orientation. This effort was led by Dr. Philip Redlich, Chief, Division of Education, with contributions by many of the faculty. A description of the program and an assessment of its effectiveness was presented at the Wisconsin Surgical Society in November 2011.[2] Our competency program includes pre- and post-testing after completion of the online Fundamentals of Surgery course and didactic interactive sessions with faculty and senior residents. Finally, an oral exam was administered to verify their ability to manage common postoperative scenarios. We are pleased to report that our entire intern group passed with flying colors!

At the other end of the spectrum, the new duty hour and supervision requirements were modified for those residents in the last two years of training. The ACGME recognizes that more senior residents occasionally have either an educational or an ethical need to stay beyond the usual duty hour limits in order to participate in patient care. These incidents must be reported, but can be justified under certain circumstances that the residency program director is mandated to track. This is a thoughtful move forward in validating the need for residents to participate in the continuity of care of the surgical patient.

One other challenging mandate was the restriction of residents in PGY-2 and above from working beyond 24 hours with four hours allowed for patient care transition only—no new patients or procedures. Just communicating all of the changes has been a challenge. Achieving and maintaining compliance is an ongoing process, but we are engaged with the goal of achieving a better training environment for our residents and a safer experience for our patients. So far, with the combined efforts of faculty and residents, we are off to a great start for this academic year. •

*Dr. Termuhlen is the President-Elect of the Association of Program Directors in Surgery and was recently appointed to the Residency Review Committee for Surgery (RRC-Surgery).*

**FOR ADDITIONAL INFORMATION** on this topic, see references, visit mcw.edu/surgery, or contact Dr. Termuhlen at 414-805-5929 or ptermuhlen@mcw.edu.

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# Sleeve Gastrectomy

**MATTHEW GOLDBLATT, MD**
Division of General Surgery

**JAMES WALLACE, MD, PHD**
Division of General Surgery

Obesity is common in our society. Both primary care providers and surgeons encounter patients who are not only morbidly obese (Body Mass Index >40), but who have significant co-morbidities associated with their weight. The most dangerous of these co-morbidities include type 2 diabetes mellitus, obstructive sleep apnea, and hypertension.

Surgical procedures to treat morbid obesity have been around for decades. However, the operations did not become mainstream until the mid 1990s, when minimally invasive techniques for bariatric surgery were developed. The most common procedure for the last 15 years has been the laparoscopic Roux en Y gastric bypass. Its results cannot be matched when compared to non-surgical weight loss options. At five years, patients maintain a 75% excess body weight loss and diabetes, hypertension, and sleep apnea are either in remission or are greatly improved.

The results of gastric bypass are excellent, but there are some drawbacks. The operation requires a small bowel anastomosis and the new connection between the stomach and small intestine bypasses the majority of the stomach and the entire duodenum. These anastomoses can lead to internal hernias, ulcers, and small bowel obstructions, as well as iron, calcium, Vitamin D, and B12 deficiencies.

For some bariatric patients, the potential side effects of a gastric bypass have led them to seek alternatives. For many, the laparoscopic adjustable gastric band (LAGB) was the choice. There is no stapling or cutting of the stomach or small intestine. The risk of bowel obstruction or vitamin or mineral deficiency is very low with a band. However, the average weight loss is only 40–50% of excess body weight, and a high number of office visits after surgery are required to maintain the proper adjustment of the band.

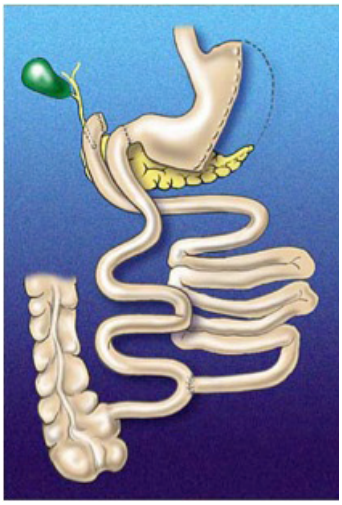

**Figure 1:** Biliopancreatic diversion with duodenal switch

The drawbacks of both the LAGB and gastric bypass have left some prospective patients seeking an alternative. The third option is the laparoscopic sleeve gastrectomy. The laparoscopic sleeve gastrectomy is a treatment of obesity that was born out of a more complex operation known as the biliopancreatic diversion with duodenal switch (BPD-DS). When performing the BPD-DS, a thin tube is made out of the stomach along the lesser curve. The divided stomach along the greater curve is then removed. The duodenum is divided just beyond the pyloris and is connected to the ileum, so there are only 100 cm of small bowel available, out of a possible 400 cm, to breakdown and digest the food, particularly fats (Figure 1).

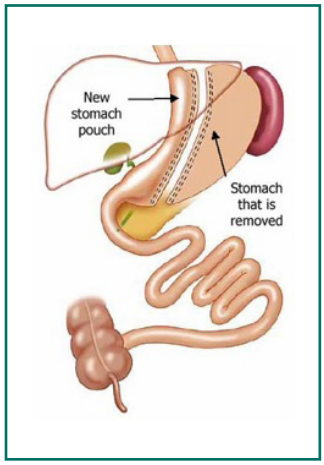


**Figure 2:** Laparoscopic sleeve gastrectomy

The weight loss from a BPD-DS is expected to be 80–85% of excess body weight. With a significant malabsorptive component, this operation was reserved for the most severely obese patients. The idea for the gastric resection (sleeve) portion of the BPD-DS to be a stand-alone operation came from some surgeons bailing out of the BPD-DS as a way to perform the larger, more complex operation in two stages (Figure 2). Surprisingly, the laparoscopic sleeve gastrectomy alone gave the patients significant, long-term weight loss without the complications associated with the malabsorptive small bowel component.

From this humble beginning, the laparoscopic sleeve gastrectomy was born. It combines the excellent long-term weight loss of a gastric bypass with the low long-term complication risk of a LAGB, without the need for an implanted device and the associated adjustments. It is performed using minimally invasive techniques with a 1–2 day hospital stay. Patients start losing weight right away and the majority of weight loss occurs within 12–18 months.

Many patients can lose a significant amount of weight on a diet in the short term, but the vast majority cannot keep it off for an extended period of time. For this reason, all obesity surgery is compared at the five-year time frame. As mentioned previously, the gastric bypass and LAGB have

a 70–75% and 40–50% average excess weight loss, respectively. In a number of studies, the laparoscopic sleeve gastrectomy has demonstrated that its five-year weight loss is 65–70%.

For the morbidly obese patient, the choices for minimally invasive weight loss surgery previously had been limited to two operations, the laparoscopic gastric bypass and the laparoscopic adjustable gastric band. Each procedure has a risk and benefit profile that had many potential patients seeking an alternative. The laparoscopic sleeve gastrectomy gives these patients the ability to achieve long-term, durable weight loss without the possible side effects of a more complex operation. •

**FOR ADDITIONAL INFORMATION**
on the bariatric surgery program at MCW, please contact Dr. Goldblatt at 414-805-5727 or mgoldbla@mcw.edu or Dr. Wallace at 414-805-5844 or jwallace@mcw.edu.

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# We Care Fund Supports Innovation and Discovery

by Meg M. Bilicki, Director of Development for the Department of Surgery

Patients with cancer, organ failure, and complications from trauma or cardiovascular disease are searching for two things: hope and a clear plan of treatment. With that in mind, scientists and clinicians in the Department of Surgery at The Medical College of Wisconsin launched the We Care Fund for Medical Innovation and Research.

Established in 2010, the We Care Fund has raised nearly $50,000 from more than 300 grateful patients, families, friends, faculty, and alumni. Under the direction of Douglas B. Evans, MD, Donald C. Ausman Family Foundation Professor and Chairman of the Department of Surgery, the fund will support physicians and researchers working at all stages of the scientific discovery process, but particularly on the development of medical treatments that cannot wait for funding from traditional sources. These projects hold the promise of improving health care for patients and their families through new and courageous medical treatments based on the latest advances in science.

The We Care Fund Committee plays a critical role in raising private funds for research and increasing community awareness. Arlene Wilson, Committee Chair, community volunteer, and donor, said, "This is an excellent way for patients and families to be a part of efforts by Medical College scientists and physicians who are finding better treatments and cures for diseases. Our ultimate goal is to develop the fund to the point that it supports a great deal of meaningful research." The committee includes 15 business, professional, and civic leaders who are committed to advancing sophisticated medical research at the College.

Contributions to the We Care Fund will support innovative medical research and clinical projects in the fields of cancer, cardiovascular disease, organ transplantation, and trauma. Traditional funding mechanisms supporting basic science and clinical care can take months or even years. Some of the most promising and exciting solutions simply cannot wait that long. The goal is to accelerate the development of those advanced, life-saving solutions by engaging the local community to help provide the best health care to Wisconsin residents.

If you or your patients would like to learn more about the We Care Fund, or are interested in making a gift, please visit the website at www.mcw.edu/surgery/WeCareFund or contact Meg M. Bilicki, Director of Development, Department of Surgery, at (414) 805-5731. •

wecare

**To refer a patient or request a transfer/consultation, please use these numbers:**

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**mcw.edu/surgery**

**Clinical Cancer Center**
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Transfers/Consultations: 877-804-4700

**Children's Hospital of Wisconsin**
Referrals/Transfers/Consultations: 800-266-0366
Acute Care Surgery: 414-266-7858

# Surgical Management of Rib Fractures and

**WILLIAM TISOL, MD**
Division of
Cardiothoracic Surgery
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(MCW Thoracic)

**MARIO GASPARRI, MD**
Division of
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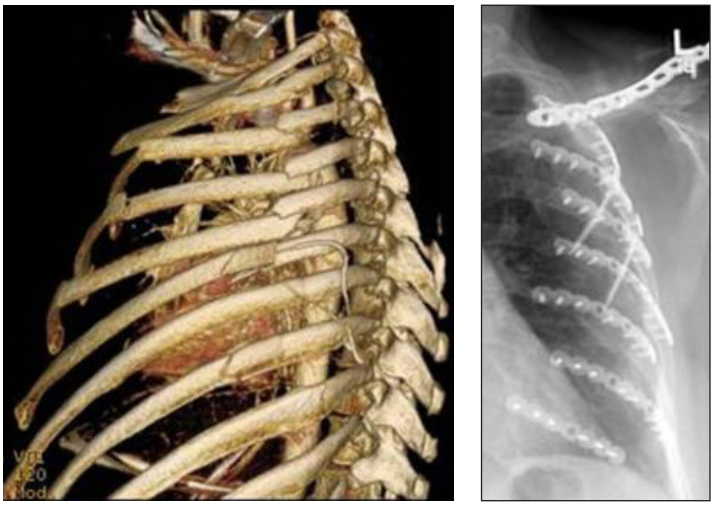
Section of Thoracic Surgery
(MCW Thoracic)

Rib fractures remain significant clinical problems and carry high mortality and morbidity rates, especially when associated with a flail component. Over the last two decades, the Section of Thoracic Surgery at The Medical College of Wisconsin has focused on treating patients with rib fractures. Thanks to recent advances in technology and encouraging reports in the surgical literature, we are on the cusp of a paradigm shift in the management of these injuries.

The difficulty in managing these injuries is rooted in the pathophysiologic triad of pain, mechanical instability, and pulmonary contusion. Chest wall pain leads to tachypnea, decreased tidal volumes, and diminished cough, which results in the predictable cascade of hypercarbia, hypoxemia, pneumonia, and ultimately, respiratory failure. The mechanical instability of a flail segment and resultant paradoxical motion of the chest wall contributes to increasing atelectasis, decreasing tidal volumes, and ineffective ventilation. Finally, the underlying pulmonary contusion, which often accompanies these injuries, leads to shunting and V/Q mismatch that exacerbates the hypoxemia.

The treatment of rib fractures and flail segments has changed considerably over the past century and parallels our understanding of the injury. Early treatment focused on external traction, but results were poor due to prolonged bed rest, immobility, and local wound problems.[1]



**Left:** CT chest with 3D reconstruction demonstrating multiple left-sided rib fractures. **Right:** Post-operative x-ray demonstrating stabilization of rib fractures with plates and intramedullary splints.

In the 1950s, the concept of internal pneumatic stabilization involving tracheostomy and positive pressure ventilation was introduced.[2] However, results again were poor due mainly to pulmonary complications and ventilator associated pneumonias.[3,4] By the 1970s, the focus of care moved from the mechanical defects of the chest wall to the underlying parenchymal injury due to pulmonary contusion;[5] and the most recent EAST guidelines published in 2006 recommend a treatment strategy of adequate analgesia, vigorous pulmonary hygiene, minimal fluid administration, and selective intubation. Rib stabilization is considered a level 3 recommendation.[6]

Unfortunately, this treatment strategy continues to be associated with significant morbidity and mortality rates. Mortality rates remain approximately 15%, with pulmonary complications approaching 25%.[7,8] More importantly, in surviving patients, the long-term morbidity is significant. Landerscaper reported on 62 patients with flail chest after trauma. With a mean follow-up of five years, long-term morbidity was significant with 49% complaining of chest wall pain, 35% complaining of moderate to severe dyspnea, and 39% never able to return to any form of employment.[9] Beal found similar results in a study of 22 injured patients, with 64% suffering long-term morbidity (chronic pain, chest wall deformity, dyspnea), and 22% being permanently disabled.[10] Because the focus of trauma units oftentimes is on overall survival and 30-day results, less attention has been paid to mitigating the long term debilitating effects of these injuries.

Given these poor results, the search for better management options continues, and the Section of Thoracic Surgery at The Medical College of Wisconsin is active in this work. More than two decades ago, Dr. George Haasler published one of these early case reports on rib stabilization,[11] and since then, numerous reports describing internal surgical fixation of rib fractures and flail chest using a variety of methods have been published from centers around the world. Today, we continue this tradition by teaching surgeons in North America and Europe how to surgically manage chest wall injuries.

To date, no definitive guidelines exist delineating which patients or which fracture patterns may benefit most. However, our operative experience of more than 100 patients allows us to identify patients we would consider for fracture fixation and in whom we have found it to be beneficial. In general, patients with obvious chest wall deformity

# Flail Chest–It's Time for a Change

and motion, or patients with more than three fractures with either flail segment or significant cortical override are considered candidates for rib stabilization. Based on the literature, these patients are at increased risk of poor outcomes.[12] Typically, these anatomical criteria correlate with the clinical conditions of intractable pain and/or respiratory failure. Additionally, when operating on these patients, both short- and long-term outcomes must be considered. In the short term, one hopes to reduce pain, decrease pulmonary morbidity (including pneumonia rates and ventilator days), and accelerate hospital length-of-stay. In the long term, one hopes to decrease the chronic morbidity of these injuries, including chronic pain and dyspnea, and allow these patients to resume pre-injury activity levels and reenter the workplace. As with any emerging field, these indications are being tested and modified to improve results. While the most benefit is seen in patients operated on soon after injury, we are also seeing significant improvements in patients operated on weeks and months after sustaining their injuries.

While there are many published case reports, to date, there are only four well-documented studies published in the English-language literature, representing a total of 169 patients. Two retrospective studies from Germany and the United Arab Emirates compared patients undergoing rib stabilization with historically matched controls treated with standard non-operative strategy.[13,14] Both studies demonstrated reduction in pneumonia rates, ventilator days, and mortality in the rib stabilization group. Two prospective studies from Egypt and Japan randomized patients to rib stabilization versus the standard non-operative strategy.[15,16] Granetzny's work demonstrated decreased chest infections, ventilator days, ICU days, and hospital days in patients undergoing rib stabilization. Tanaka also demonstrated reduced pneumonia rates, ventilator days, ICU days, and medical expense in patients undergoing rib stabilization. Additionally, he showed improved long-term results including improved pulmonary mechanics, less chest wall pain, and less dyspnea in the rib stabilization group. Importantly, he showed that a significantly higher number of patients in the rib stabilization group were able to return to work.

The open surgical repair and reconstruction of complex rib injuries is an operation whose time has clearly arrived. To date, the evidence has encouraged multiple surgical specialties including thoracic surgeons, orthopedic surgeons, plastic surgeons, and trauma surgeons to embrace the idea of rib stabilization and further evaluate and better define the indications, techniques, devices, and outcomes. In this spirit, the Division of Thoracic Surgery at The Medical College of Wisconsin has established a Rib Fracture Clinic to evaluate and manage patients with rib fractures. While the goal of the clinic is to provide expert thoracic surgical opinion on the severity of the injury and review options for treatment, the hope is to bring the management of rib fractures and flail chest into a new era and limit the long-term effects currently suffered by many patients. •

**FOR ADDITIONAL INFORMATION** on this topic visit mcw.edu/surgery. To refer a patient to the Rib Fracture clinic, please contact Dr. Tisol or Dr. Gasparri at 414-955-6904, or by e-mail at wtisol@mcw.edu or mgasparr@mcw.edu.

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## A Disease-specific Pilot Program for Outpatient EPIC Referrals

The Medical College of Wisconsin Department of Surgery has initiated a pilot program for disease-specific, outpatient EPIC referrals for those programs previously placed via either the 'General Surgery' and/or the 'Clinical Cancer Center' referrals.

**For urgent/emergent issues, requiring same-day attention, please call the Acute Care Surgery service via the Froedtert Hospital page operator (414-805-3000).**

These referrals include::

### Bariatric/Minimally Invasive Surgery (RFSUC.002)
Bariatric Surgery, foregut surgery (achalasia, hiatal hernia, reflux surgery)

### Breast Cancer Surgery (RFCCC.003)
For benign breast conditions, use the Breast Care Referral, Undiagnosed

### Colorectal Surgery (RFSUC.003)
Anorectal disease, colorectal cancers, benign colorectal disease, inflammatory bowel disease

### Condon Hernia Institute (RFSUC.005)
All abdominal wall defects/hernias including ventral, recurrent, incisional, inguinal, femoral

### Endocrine Surgery (RFSUC.001)
Thyroid cancer, benign thyroid disease, parathyroid disease, adrenal tumors, carcinoid tumors, carcinoid disease, inherited endocrine tumors

### General Surgery (RFSUC.000)
Abdominal pain, abdominal mass, gallbladder disease, soft tissue masses/nodules, feeding tubes

### Hepatobiliary Surgery (RFSUC.004)
Liver tumors (benign and malignant), gallbladder disease, biliary tree disorders, bile duct cancers

### Pancreatic Surgery (RFSUC.006)
Pancreatic cancer, benign pancreatic diseases (cysts, pancreatitis), pancreatic neuroendocrine tumors

### Surgical Oncology (RFCCC.002)
Melanoma, retroperitoneal sarcoma, neuroendocrine tumors, carcinoid tumors, carcinoid disease, carcinomatosis, hyperthermic chemoperfusion therapy (HIPEC)

# Mary Shimoyama, PhD, joins Department of Surgery Faculty

The Department of Surgery is pleased to announce that Mary Shimoyama, PhD, has joined the faculty of the Department of Surgery (Division of Cardiothoracic Surgery). Dr. Shimoyama has worked as the Program Manager for the Rat Genome Database in the Human and Molecular Genetics Center at MCW.

Dr. Shimoyama has worked in the field of informatics for more than 20 years, primarily working with genomic and molecular function and phenotype data. She currently oversees a staff of seven biologists and four bioinformatics specialists involved in the data curation and software projects for the Rat Genome Database. Her research interests include the development and implementation of ontologies and data standards for genomic, phenotype, and clinical measurement data, and the design of data mining and visualization tools to assist researchers in linking phenotypes to genotypes. Dr. Shimoyama lived in Japan for 15 years and has four children aged 17 to 26. She can be reached at 414-456-7505 or shimoyama@mcw.edu.•

## Please Update Your Address

The Medical College of Wisconsin Department of Surgery wants to stay in touch. Please contact Dana Schmidman at dschmidm@mcw.edu to update your contact information.

# Honors and Awards

Dr. Kong

Dr. Rentea

On September 14, The Medical College of Wisconsin held its annual Convocation and Research Day. Amanda Kong, MD, MS (Surgical Oncology) was awarded the Junior Faculty Award for Non-Basic Research for her study, "The Role of Screening Mammography in Detecting Breast Cancer: Who Should be Screened?" and Rebecca Rentea, MD received the Clinical Fellow and Resident Award for Basic Research for her study, "Tight Junction Protein Alterations in a Neonatal Necrotizing Enterocolitis Rat Model are Altered with Intestinal Alkaline Phosphate Administration." Congratulations Drs. Kong and Rentea!

Congratulations to this year's Outstanding Medical Student Teachers. Several Department of Surgery faculty, residents, and physician extenders have been selected as recipients. These recipients were formally recognized on Wednesday, December 21, between M&M and Grand Rounds, in the Helfaer Auditorium at Froedtert Hospital. Please join us in thanking:

### M1-M2 Biochemistry

Philip Redlich, MD, PhD

### M3 Clerkship

G. Hossein Almassi, MD
Joseph Battista, MD
Karen Brasel, MD, MPH
Dean Klinger, MD
Caitlin Patten, MD
Carolyn Pinkerton, MD
Peter Rossi, MD
Allan Roza, MD
Jill Whitehouse, MD

### M4 Subinternships

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Kirk Ludwig, MD

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# MARK YOUR CALENDARS

Recent Event

### February 3–4, 2012: Third Annual Liver Pancreas Symposium

The first day of this event consisted of an open house during which physicians had the opportunity to visit endoscopy, interventional radiology, and surgery. The second day offered lectures in the evolving management of liver and pancreatic diseases and featured Dr. Michael Soulen, University of Pennsylvania, who spoke on hepatic artery directed therapy for liver cancer.

Upcoming Events

### May 11, 2012: Complex Abdominal Hernia Symposium

This event is designed to educate the community general and plastic surgeon about the latest techniques for complex abdominal wall reconstruction. For more information, see www.mcw.edu/surgery.

### May 25, 2012: Vascular Access Symposium

The Vascular Access Symposium will be held on Friday, May 25, 2012, at Froedtert Hospital. For more information, see www.mcw.edu/surgery.

### June 29–30, 2012: Fourth Annual Medical College of Wisconsin and University of Texas M. D. Anderson Cancer Center Endocrine Surgery Symposium

This symposium will be held at The Cape Codder, Hyannis, MA, with invited speakers from Massachusetts General Hospital, Brigham and Women's Hospital, and New York University Medical Center. For more information, see www.mcw.edu/surgery.