The Center of Excellence for Treatment of Barrett’s Esophagus is an alliance of numerous professionals from several clinical institutions, research organizations, and supporting services providing comprehensive and well-coordinated care for patients, as well as conducting research. This partnership has resulted in the introduction of new endoscopic treatments and the development of new optical technologies for non-invasive detection of cancer and dysplasia.

Photodynamic therapy for Barrett’s esophagus with high grade dysplasia was pioneered in 1990 at the Laser Center, located on the 4th floor of the Thompson Cancer Survival Center. The Laser Center was one of the first institutions to introduce Radiofrequency Ablation (RFA) for treatment of Barrett’s esophagus. Currently, the center provides an array of endoscopic treatment options for Barrett’s patients to include Endoscopic Mucosal Resection (EMR) using both cap assisted and ligation assisted techniques, radiofrequency ablation (BARRX) using HALO 60, HALO 90, HALO 360, HALO 360 Express, Through-the-Scope HALO, and HALO Ultra catheters, Nd:YAG laser ablation, as well as cryotherapy. Our medical staff have published extensively in medical and scientific journals (see publication list).

A Multidisciplinary Program By A Team of Experts: Bergein F. Overholt, M.D., John M. Haydek, M.D., Raj I. Narayani, M.D., and Masoud Panjehpour, Ph.D., have 27 Years of Experience in Managing Thousands of Barrett’s Patients.

MISSION

We strive to provide state-of-the-art treatments for management of Barrett’s esophagus.

We are dedicated to achieving the best treatment outcomes and patient satisfaction through a partnership between healthcare providers, research institutions, and support services.

VISION

We will be the leaders in the application of endoscopic treatments for Barrett’s esophagus.

For consultation or appointments contact us at:

Laser Center
Thompson Cancer Survival Center
1915 White Avenue, Knoxville, TN  37916
Phone: (865) 331-1433
fax (865) 331-1585
Email: mawhitaker@covhlth.com

Free housing is available for out-of-town patients at the Fellowship Center.
Information about Barrett’s Esophagus and GERD

What is Gastroesophageal reflux disease (GERD)?

Gastroesophageal reflux disease (GERD) is the chronic backflow of stomach contents into the esophagus. While the tissue lining of the stomach is able to handle digestive contents such as acid, the lining of the esophagus cannot. As a result, when stomach contents back up into the esophagus it can cause a burning sensation commonly referred to as heartburn, the major symptom of GERD. In addition to heartburn, other symptoms associated with GERD include regurgitation chest pain, hoarseness, wheezing and chronic cough. A major complication of GERD is Barrett’s esophagus, a premalignant condition of the esophagus.

More than 15 million Americans suffer from daily heartburn. Until recently, treatment options for GERD have been limited to chronic drug therapy or anti-reflux surgery. While prescription medications help suppress acid production they do not prevent the backflow of gastric contents into the esophagus. Anti-reflux surgery is effective in addressing the root cause of GERD by correcting the weakened valve mechanism. The surgery requires general anesthesia, multiple incisions and a recovery period lasting several days. The newer treatments for GERD include the Stretta procedure, TIF (Transoral Incisionless Fundoplication) and the Lynx procedure.

What is Barrett’s Esophagus?

Barrett’s esophagus is a precancerous condition that developed in approximately 10% of patients who have gastroesophageal reflux disease (GERD). In Barrett’s esophagus, the normal cells that line the esophagus called squamous cells turn into a type of cell called specialized columnar cells with intestinal metaplasia or Barrett’s esophagus.

The diagnosis of Barrett’s esophagus involves an endoscopy procedure to look at the lining of the esophagus and biopsies to examine samples of suspect tissue. To do an endoscopy, your doctor gently guide a long thin tube called an endoscope through the mouth and into the esophagus. The endoscope contains a camera and light that allows the doctor to see the lining of the esophagus and to remove a small tissue sample call a biopsy. The biopsy will be examined by a pathologist to see whether the normal squamous cells have been replaced with Barrett’s cells.

Once the cells in the lining of the esophagus have turned into Barrett’s cells they will not revert back to normal. In about 5% of patients, the Barrett’s cells may develop abnormal changes called dysplasia. Over several years, the dysplasia may progress into adenocarcinoma (cancer) of esophagus. Patients with Barrett’s esophagus are 30-40 times more likely to develop esophageal cancer than the normal population.

There are different grades of dysplasia. Most patients will not develop any dysplasia within their Barrett’s esophagus. If minor concerning changes are noted by the pathologist under the microscope, the diagnosis of low-grade dysplasia is made. If major concerning changes occur, the diagnosis of high-grade dysplasia is made. High-grade dysplasia is very similar to carcinoma in situ or superficial cancer. While high-grade dysplasia has a high change of progressing into cancer, carcinoma in situ will eventually developing to invasive esophageal cancer if not treated.

What is Genomic Testing for Barrett’s Esophagus Patients?

Patients with Barrett’s esophagus are at higher risk than the general population for developing esophageal cancer. The standard of care for Barrett’s patients has been endoscopic biopsy surveillance to detect dysplasia or early cancer.

A question that is frequently asked is why does one patient with Barrett’s esophagus progress to cancer while another patient does not. The answer is felt to lie in the genes of the esophagus that can change over time predisposing one to further genetic changes and eventually into cancer. By finding these abnormal genes early on, we may be able to intervene prior to the onset of dysplasia or cancer thus preventing its development.

Most tests rely on a molecular biology technique of endoscopic biopsy samples. Extensive research is presently occurring to help find the right gene or set of genes that will predict with a high degree of certainly who will develop dysplasia and who will not.

What are the treatment options for Barrett’s esophagus?

The treatment options of Barrett’s esophagus depends on the grade of dysplasia. If no dysplasia is present, most authorities do not recommend treatment although there are certain circumstances were treatment may be advised. If low-grade dysplasia is seen and reproduced, many authorities recommend endoscopic treatment although they are times when a period of close observation is felt best. If high-grade dysplasia is present, most authorities would recommend some type of treatment which would include endoscopic procedures or surgery. If cancer is present, a much higher degree of concern exits and the best options for therapy will be based on a whole variety of information including patient age and health as well as endoscopic, radiologic and pathologic assessment of the tumor.

The options for endoscopic treatment include endoscopic mucosal resection (EMR), radiofrequency ablation, cryotherapy, contact ablation or photodynamic therapy (PDT). These will be discussed below.

What is Photodynamic Therapy (PDT)?
Photodynamic therapy is a treatment that uses a combination of a photosensitizer (a light activated medication) called Photofrin and laser light to destroy abnormal cells. PDT patients are injected with Photofrin to render their tissue extremely sensitive to laser light. The lesion is then illuminated with a laser light of proper power and wave length. The interaction of laser light and a Photofrin causes a chemical reaction killing the abnormal cells. A side effect of Photofrin is light sensitivity. Patients must avoid direct exposure to sunlight and bright lights for about 4-6 weeks. The primary complication of PDT is esophageal scarring and narrowing of the lumen. This occurs in approximately 20% of patients and is managed by dilation with the endoscope.

While PDT was the first original endoscopic treatment for patients with Barrett’s and high grade dysplasia, its risks now limit its use to tumor reduction in those with advanced esophageal cancer or as an alternative to esophagectomy (the surgical removal of the esophagus) for patients with early cancer.

What is Radiofrequency Ablation (RFA) procedure for Barrett’s esophagus?

Radiofrequency ablation, also commonly called BARRX or the Halo procedure, is a new endoscopic technique used for the treatment of Barrett’s esophagus. It is a technique that allows radiofrequency energy to be directed to the abnormal cells in an automated and controlled fashion limiting its tissue injury to the abnormal cells and preventing deeper normal tissue involvement. The ablation may be repeated over time until the entire area of abnormal cells are resolved. The entire procedure is performed as an outpatient under sedation provided by an anesthesiologist. Typically the procedure takes about 15-20 minutes. Post treatment, patients may experience mild pain and/or nausea for several days. These symptoms are easily controlled with medications. Patients are advised to adjust their diet for 24-hour hours after treatment followed by a soft food diet for several days afterwards. About 3 months after the treatment, a repeat endoscopy is performed to evaluate the effectiveness of the treatment and perform repeat treatments if needed. Effective acid control with a proton pump inhibitor is crucial during the healing process to assist with healing and prevent Barrett’s return.

RFA can be delivered through a variety of catheters. Short segments or small patches of abnormal cells can be treated with a HALO 90 or Halo 60 device which is attached to the end of the endoscope and are about the size of a postage stamp. Even smaller patches may be treated by a through the scope method with Channel RFA. Larger segments are treated with a balloon technique called a HALO 360 Express ablation catheter which can treat up to 4cm at a time.

What is Endoscopic Mucosal Resection (EMR)?

Endoscopic mucosal resection is an endoscopic procedure used to remove small nodules, early cancers or segments of Barrett’s esophagus that are resistant to simple treatment. The Center utilizes both cap assisted and ligation assisted techniques. Using the cap assisted technique, a nodule is removed by endoscopically placing a tiny rubber band around the nodule forming a pseudo-polyp making it easier to grasp and remove with a cutting device. The procedure is performed during routine endoscopy with sedation. An advantage of the EMR technique is that the nodule can be removed in total giving the pathologist a whole specimen to evaluate rather than just a small biopsy.

What is endoscopic thermal ablation?

Endoscopic thermal ablation is an outpatient procedure that uses both laser and non-laser sources to thermally ablate the Barrett’s esophagus. The Center provides an Nd:YAG laser contact probe to ablate tiny areas of Barrett’s that are not suitable for radiofrequency ablation or cryoablation. It is frequently used during routine follow-up procedures and can be performed with simple sedation. Bipolar and monopolar electrocoagulation techniques are also available.

What is cryotherapy for treatment of Barrett’s esophagus?

Cryotherapy is a new technique that uses the extreme cold to destroy the Barrett’s esophagus. Liquid nitrogen, CO2 and nitrous oxide are among available sources of extreme cold. The Center uses the through-the-scope Cryoballoon Focal Ablation system that consists of a battery powered handle, a balloon catheter and a cartridge that stores the liquid nitrous oxide. The system is programmed to deliver a preset amount of fluid inside the balloon after it is positioned within the Barrett segment during a routine endoscopy. The cryotherapy is maintained within the balloon catheter eliminating the need for venting of the gas from the esophagus and stomach. The system delivers more accurate treatment and is safer to apply in an outpatient procedure.

What is Bravo pH Monitoring?

https://www.thompsoncancer.com/barrets/information-barrets-esophagus-gerd/
Accurate diagnosis of gastroesophageal reflux disease (GERD) is critical before an effective treatment is initiated. The Center uses the world’s first catheter-free test for GERD diagnosis called the Bravo® pH Monitoring System.

Using the Bravo system, a miniature pH capsule, approximately the size of a gel cap, is temporarily attached to the wall of your esophagus during a routine endoscopy. The capsule measures pH levels in the esophagus continuously for 48 hours and transmits the data wirelessly to a portable receiver worn on the patient’s waistband. There’s no cumbersome catheter or visible wires. After the capsule stops transmitting data, the patient returns the receiver to the Laser Center. The pH data is then retrieved from the receiver. Several days after completion of the study, the capsule spontaneously sloughs off the wall of the esophagus and is passed through the gastrointestinal tract.

These pH measurements allow the physician to effectively evaluate the acid reflux symptoms and recommend treatment options. The Bravo pH monitoring system allows patients to continue normal activities during the test period, so the patient can eat and drink normally, bathe, sleep comfortably, and maintain daily life.

Patients are restricted from undergoing an MRI (Magnetic Resonance Imaging) for thirty days after the Bravo procedure.
Literature Review

Just want the facts?

Here's a list of notable information about Barrett's Esophagus and Gastroesophageal Reflux Disease (GERD).

- Barrett's Esophagus is a complication of Gastroesophageal Reflux Disease (GERD).
- Barrett's Esophagus is considered a precursor to esophageal adenocarcinoma.
- GERD affects an estimated 25%-35% of the US population (7%-10% with daily symptoms).
- 10%-20% of patients with chronic GERD symptoms have Barrett's Esophagus.
- 44% of Barrett's patients lack consistent severe GERD symptoms.
- Barrett's Esophagus patients have 30-125 times greater risk of developing esophageal cancer.
- The incidence of esophageal adenocarcinoma is rising more rapidly than any other cancer, six fold increase from 1975 to 2001.
- The prevalence of Barrett's Esophagus in general population is 1.6%, approximately 3.3 million in the United States.
- In an endoscopic series of patients, 0.9%-4.5% had Barrett's Esophagus. The prevalence of Cancer, High Grade Dysplasia, and Low Grade Dysplasia in Barrett's Esophagus are 6.7%, 3.0%, and 7.3%, respectively.
- The incidence rate of Cancer, High Grade Dysplasia, and Low Grade Dysplasia in Barrett's Esophagus are 0.5%, 0.9% and 4.3% per year, respectively.
- 5% of patients with Barrett's Esophagus develop esophageal cancer within 5-8 years of diagnosis.
- The incidence of High Grade Dysplasia progressing to cancer is 10% (range 6%-19%) per year.
- The incidence of Low Grade Dysplasia progressing to cancer is 0.6% per year.
- 53% of patients with Cancer/High Grade Dysplasia have no dysplasia at their 1st two scopes.
- Short segment Barrett's (≤ 3 cm) is 3 times more common than long segment Barrett's Esophagus.
- Genetic variation in two chromosomes have been linked to development of Barrett's Esophagus.
- Risk of mortality from esophagectomy for Barrett's Esophagus is 2% (range of 0-4%).
- 5-year survival rate for late stage esophageal adenocarcinoma is approximately 13%.
Treatment for Watermelon Stomach – Gastric Antral Vascular Ectasia (GAVE)

GAVE (Gastric Antral Vascular Ectasia), also known as “Watermelon Stomach”, is a condition in which the blood vessels in the lining of the stomach become fragile and become prone to rupture and bleeding. The stomach lining exhibits the characteristic stripes of a watermelon when viewed by endoscopy. Symptoms of watermelon stomach may include chronic anemia, acute gastrointestinal bleeding, vomiting of blood and dark, tarry stools.

The exact cause of watermelon stomach is not known. Watermelon stomach is often associated with a number of conditions, including portal hypertension, chronic renal failure, collagen vascular diseases and systemic sclerosis. The chronic blood loss in watermelon stomach patients causes iron-deficiency anemia, requiring iron supplements and blood transfusions.

Treatment Options

Iron supplements and blood transfusions are commonly used to control watermelon stomach symptoms. Lasers and argon plasma coagulation may also be used for management of bleed in the stomach lining.

The Center of Excellence uses the HALO 90 ablation technique, a new endoscopic outpatient procedure for treatment of patients with watermelon stomach. The HALO 90 catheter allows treatment of a large area of affected tissue rapidly with well controlled depth of ablation. Each application of HALO 90 catheter provides a uniform treatment to a rectangular area of 20 mm X 13 mm, much larger than argon plasma coagulator can achieve. The entire diseased tissue may be treated in one session using repeated applications of HALO 90 ablation. HALO 90 ablation may be used in patients who have failed other modalities.
About the Center of Excellence

Background

The Center of Excellence for treatment of Barrett’s esophagus is an alliance of numerous professionals from several clinical institutions, research organizations, and supporting services, providing comprehensive and well-coordinated care for patients, as well as conducting preclinical and clinical research.

This partnership has resulted in the introduction of new treatments for patients and the development of new technologies for early detection of cancer. A complete description of different components of the program is provided later in this section.

Photodynamic therapy for Barrett’s esophagus with high grade dysplasia was pioneered in 1990 at the Laser Center, located on the 4th floor of the Thompson Cancer Survival Center. The Laser Center was one of the first institutions introducing BARRX procedure for treatment of Barrett’s esophagus and has over 1400 patients so far. Over two decades of experience has resulted in excellent treatment outcomes in our patients (see Publications By Our Staff).

State-Of-The-Art Treatment and Technology

State-Of-The-Art Treatment and Technology

The center is an state-of-the-art outpatient endoscopy facility equipped to provide an array of treatment options for patients with Barrett’s esophagus to include Radiofrequency Ablation using a variety of HALO devices (also known as BARRX procedure), Endoscopic Mucosal Resection (EMR), Cryotherapy, Nd:YAG laser treatment as well as bipolar or monopolar electrocoagulation. Diagnostic procedures such as Endoscopic Ultrasound (EUS) for staging of disease as well as Bravo pH monitoring for GERD patients are also used routinely.

International Leadership

The Laser Center is internationally known as a leader in the treatments for Barrett’s esophagus. The Laser Center has gained this reputation as a result of innovations in protocol development, excellent treatment outcomes in a large number of patients, numerous publications and book chapters, and numerous presentations. The light delivery balloon for PDT was initially tested in our laboratory at the University of Tennessee’s College of Veterinary Medicine. The clinical development of the balloon followed at the Laser Center. This work led to a multicenter international study for treatment of HGD in Barrett’s esophagus, which was conducted under the direction of the Medical Director of the Center of Excellence.

Distribution of Patients Referred to Laser Center

Patients are referred to the Laser Center from all areas of the United States and from other countries. To date, patients have traveled to the Laser Center from 44 states and several foreign countries. In fact, 25% of patients enrolled under the multicenter international PDT study were treated at the Laser Center. The Laser Center is routinely invited to participate in preclinical and clinical trials of new treatments. The clinical staff regularly chair and moderate national and international conferences and serve as reviewers for medical and scientific journals where related papers are published.

Research Program

The Center of Excellence is committed to improving patient care and treatment outcomes through research. The clinical research program has been active since 1989 investigating numerous photodynamic therapy protocols and ablation procedures such as radiofrequency ablation and cryoablation. Through clinical research, the Laser Center has obtained extensive experience in treating Barrett’s esophagus and early esophageal cancer as well as in lung cancer, skin cancer, metastatic breast cancer, Kaposi’s sarcoma, and other cutaneous cancers.

The preclinical research program has been done at the College of Veterinary Medicine, University of Tennessee which has Laboratory space assigned for our collaborative work. The animal studies conducted there were instrumental in the development of the balloon light delivery device for PDT, a critical element in improving treatment outcomes. In addition, the partnership with scientists at the Oak Ridge National Laboratory has resulted in the development of techniques for early detection of cancer in Barrett’s esophagus and skin cancers such as basal cell carcinoma and squamous cell carcinoma.

Our faculty have received funding from:

- National Institutes of Health
- Department of Energy
- American College of Gastroenterology
- American Society for Gastrointestinal Endoscopy
- American Society for Laser Medicine and Surgery
- QLT, Inc.
- Axcan Pharmaceuticals
Miravant, Inc., and
DUSA Pharmaceutical

Educational Services and Outreach Program

The Laser Center was a national training facility for treatment of Barrett’s esophagus and esophageal cancer where trainees learned the proper application of photodynamic therapy for Barrett’s esophagus. Our hands-on teaching laboratory located in the College of Veterinary Medicine was used to train physicians and nurses in an animal model. Physicians and nurses from many prestigious medical centers received training at our institution.

Patient education is strongly emphasized in our program via personal phone discussions between our patients, physicians and staff. An extensive array of brochures and other informative material is mailed to patients before they come for treatment. Prior to the procedure, the nurse and doctors contacts the patient and discusses the treatments in detail. Ample opportunity is provided for the patients to ask questions.

Outcome Comparison Against External Benchmarks

Continuous comparison of outcomes against external benchmarks is achieved via publications, presentations, and literature reviews. Our faculty have published extensively in medical and scientific journals along with several book chapters and review articles (see Publications By Our Staff).

In addition, the faculty routinely have presented research papers at the annual meetings of the:

- International Photodynamic Association,
- American College of Gastroenterology,
- Digestive Disease Week,
- American Society for Laser Medicine and Surgery, and
- Photonics West

This allows for face-to-face interaction with other physicians and scientists.

Our Medical/Nursing Research Library, located on the 3rd floor of the Thompson Cancer Survival Center, conducts monthly searches of the published articles to keep abreast of the latest developments in the field of Barrett’s esophagus.

Excellent Patient Satisfaction Score

All patients are mailed a satisfaction survey along with a self-stamped return envelope. Patients are asked to rate all aspects of their care and assign an overall satisfaction score of 1 to 10, with 10 being very satisfied. The charts below show the monthly average scores for 2014 and 2015. Often patients assigned an overall satisfaction score of 11 or higher, pushing the average monthly score to higher than 10, as seen for February 2015.

These high satisfaction scores are the result of 27 years of clinical experience concentrating on treatment and follow-up of patients with Barrett’s esophagus.

Full Range of Clinical Services

We continuously strive to meet every need of our patients. Ancillary services such as laboratory, radiology and patient and family support are provided within the Thompson Cancer Survival Center. In the rare case of an emergency, inpatient services are available at Fort Sanders Regional Medical Center, across the street from the Thompson Cancer Survival Center.
Components of the Center of Excellence

Laser Center at Thompson Cancer Survival Center (TCSC)

The Laser Center, a department of Fort Sanders Regional Medical Center, occupies the fourth floor of the Thompson Cancer Survival Center where all clinical procedures are performed. The Laser Center is a state-of-the-art outpatient facility fully equipped to provide a full array of treatment options for Barrett’s patients, such as Radiofrequency Ablation (BâRRX), Endoscopic Mucosal Resection (EMR), Cryoblation, Laser ablation as well as Bravo pH monitoring for patients with GastroEsophageal Reflux Disease (GERD). All procedures are performed under moderate sedation using propofol provided by the anesthesia department. The facility consists of the treatment area, recovery area, waiting room, registration area, patient education room, exam rooms, and administrative area. The Laser Center is staffed by laser treatment specialists, physicians, nurses, research staff, and administrative staff.

Fort Sanders Regional Medical Center (FSRMC)

Fort Sanders Regional Medical Center is a 556-bed hospital serving Knoxville and surrounding counties and is located across the street from the Thompson Cancer Survival Center. TCSC and the Medical Center provide laboratory, pathology, radiology, cardiology, and oncology services. FSRMC is used if a need for inpatient services arises.

Gastrointestinal Associates (GIA) / The Endoscopy Center

Gastrointestinal Associates (GIA)/The Endoscopy Center consists of thirteen gastroenterologists, a several practitioners, nurses and staff. The Endoscopy Center is a licensed ambulatory surgery center (ACS) associated with GIA where endoscopy procedures are performed. It holds the distinction of being the first certified freestanding endoscopic ASC in the nation. The group has been involved in clinical and preclinical activities photodynamic therapy for esophageal cancer and dysplasia in Barrett’s esophagus since 1989.

Innovative Pathology Services

Innovative Pathology Services, located within a block of Thompson Cancer Survival Center, provides histological evaluation of all biopsies performed at the Laser Center. The group consists of 15 board certified pathologists who provide next day turn around on final pathology reports. All samples are evaluated by two expert pathologists. Such prompt turn-around time allows the evaluation of patient response to treatments rapidly, offering additional treatments if necessary within 24 hour of biopsies.

Anesthesia Alliance of East Tennessee

Anesthesia Alliance of East Tennessee, located across the street from Thompson Cancer Survival Center, provides Monitored Anesthesia Care (MAC) for all endoscopy procedures performed at the Laser Center. The group consists of 17 board certified anesthesiologists and over 50 Certified Registered Nurse Anesthetists (CRNA). The Group has been providing anesthesia services for the Laser Center patients for several years.

Clinical Trials Department, Thompson Cancer Survival Center (TCSC)

Clinical Trials Department provides state-of-the-art clinical research for physicians and patients in the East Tennessee area. The staff includes a team of highly qualified oncology certified nurses who coordinate and perform data management for oncology protocols in cooperation with NCI research groups such as the Southwest Oncology Group, the National Surgical Adjuvant Breast and Bowel Program, and the Clinical Trials Support Unit.

In addition, research is conducted in collaboration with several pharmaceutical sponsors and other cancer research centers. Clinical Trials department has been involved with Barrett’s research since 1989. The department is located on the 7th floor of the Thompson Cancer Survival Center.

College of Veterinary Medicine, University of Tennessee (UTCVM)

College of Veterinary Medicine, University of Tennessee (UTCVM) The Laboratory at the College of Veterinary Medicine at the University of Tennessee has been the site of pre-clinical research. The laboratory has been used for research and development of new techniques and devices as well as for hands-on training during our PDT courses. The Laboratory is equipped with lasers and endoscopy systems similar to those used in our clinical areas.

This laboratory was critical in testing and developing the balloon for PDT of Barrett’s esophagus. The small animal clinic within UTCVM is the referral center for East Tennessee where client owned animals have access to the latest in diagnostic and therapeutic modalities.

Advanced Biomedical Science and Technology Group, Oak Ridge National Laboratory (ORNL)
Advanced Biomedical Science and Technology Group, Oak Ridge National Laboratory (ORNL) The Advanced Biomedical Science and Technology Group is a biomedical research division located at Oak Ridge National Laboratory, about 20 miles from the clinical facilities of the Center of Excellence. The group at ORNL conducted extensive research in collaboration with Laser Center on non-invasive optical techniques for detection of dysplasia and early cancer in Barrett's esophagus and skin cancer.

Medical/Nursing Research Library

The Medical/Nursing Research Library is located on the third floor of the Thompson Cancer Survival Center. It currently houses more than 5,000 books and subscribes to 175 clinical journals. The library is staffed with two librarians, who are available to provide immediate access to medical journals and up to the moment medical literature through library online databases. The library conducts monthly searches of databases for all relevant published papers.

Fellowship Center

The Fellowship Center is an outpatient lodging center created to assist out of town patients and family members with housing while the patients receive care at the Thompson Cancer Survival Center or the Fort Sanders Regional Medical Center. The Fellowship Center consists of eighteen fully furnished apartments with laundry facilities. The apartments are provided free of charge to all patients. The services are totally sustained through the generosity of its guests and friends. The Fellowship Center is a member of the National Association of Hospital Hospitality Houses. The Fellowship Center is located within a block of the Laser Center.

Thompson Cancer Survival Center Foundation

The Thompson Cancer Survival Center Foundation, established in 1994, extends resources to such projects as therapeutic and diagnostic research, education, and direct patient care. The Foundation has been instrumental in the establishment of the Barrett’s treatment program and continues its support through annual grant applications.
The Fellowship Center

Since 1984, The Fellowship Center has provided free lodging for families coping with serious illnesses. Through the generosity of the Lucille S. Thompson Family Foundation, The Fellowship Center expanded in 1992 to eighteen furnished apartments, a community family room, and laundry facilities.

Who may use The Fellowship Center?

Thompson Cancer Survival Center patients and their families who live more than 30 miles from Knoxville have priority use of Fellowship Center apartments. As space permits, we welcome outpatients from Patricia Neal Rehabilitation Center and referrals from area health care facilities.

Amenities

- 18 furnished, one-bedroom apartments located at 1800 and 1815 Laurel Avenue, Knoxville, TN 37916
- Twin beds, sofa sleeper, furnished kitchen, microwave, cable TV, telephone and fresh linens
- Community family room, stocked pantry, and laundry facility
- The Fort Sanders Auxiliary provides a station wagon to transport outpatients to the Thompson Cancer Survival Center for treatment and weekday lunches for all guests
- The staff is on call 24 hours a day

How do I request lodging?

Lodging requests may be made through hospital Social Services or by calling (865) 331–1725.

How can I help?

The Fellowship Center is sustained through the Fort Sanders Foundation, Covenant Health, and the generosity of our guests and friends. You can support our efforts through your donation of money, items, furnishings, time, and talent. Please use this link to make an online donation:

Give Now

Or mail your contribution to: **Fort Sanders Foundation**, 280 Fort Sanders West Blvd., Suite 202, Knoxville, TN 37922. If you have any questions about your cash donation, please call the Foundation at (865) 531-5210.

You may also donate items for community areas and apartments. Our current wish list includes:

**Kitchen Supplies**

- Storage bags (quart & gallon size)
- Heavy duty aluminum foil
- Dishwasher detergent
- Carry-out food containers (meal and dessert size)

**Apartment Needs**

- Wall clocks
- Flashlights
- AA/AAA batteries
- Dish cloths and towels
- Hair dryers
- Frying pans (8 inch and 10 inch)
- Table lamps and shades
- First aid kits
- Facial tissues
- Soft toilet tissue
- Liquid dish soap
- Liquid antibacterial hand soap
- Light bulbs (60 watt and 3-way)

**Cleaning Supplies**
- Fabric softener sheets
- Laundry detergent
- Liquid fabric softener
- Large trash bags (four gallon)
- Antibacterial all-purpose cleaner
- Toilet bowl cleaner

**Pantry Items**
- Microwave popcorn
- Snack cakes and crackers
- Canned soups
- Boxed meals
- Canned meat (tuna and chicken)
- Hot chocolate
- Tea bags

Please drop off donated items at The Fellowship Center, 1800 Laurel Avenue, Apartment #7.

Thank you for your support!
Our Team of Experts

Our Team of Experts

Excellence may only be achieved by a multidisciplinary approach to patient care. Our Team of Experts consists of a group of highly motivated and experienced physicians, scientists, nurses, technicians, and supporting staff with a common goal of delivering the best care to our patients. In addition, our patients constitute an important part of our team. In fact, our patients have been the best advocates of the program.

The members of the Center of Excellence and their affiliations are:

Bergein F. Overholt, M.D., MACP, MACG, FASGE

Dr. Overholt is a gastroenterologist at Gastrointestinal Associates, P.C. (GIA), Founder and Medical Director of Center of Excellence (1988-2011), and managing partner at GIA. He is a graduate of the University of Tennessee Medical School. He did his internship and residency at the University Hospital in Ann Arbor, Michigan. Following this, Dr. Overholt completed a two-year fellowship in gastroenterology at University Hospital in Ann Arbor. During that time, he served in the Cancer Control Program of the U.S. Public Health Service in order to develop the flexible fibersigmoidoscope/colonoscope. He later received the prestigious Schindler Award from the American Society for Gastrointestinal Endoscopy and the William Beaumont Award of the American Medical Association for this development. Dr. Overholt completed two additional years of training in gastroenterology at New York Hospital-Cornell Medical Center.

Dr. Overholt’s clinical and pre-clinical research in treatments for Barrett’s esophagus have been the pioneering work in the field. He is considered an international leader in the use of PDT and radiofrequency ablation for Barrett’s esophagus and has lectured and published extensively on the subject. He has served as President of the American Society for Gastrointestinal Endoscopy and the American Society of Outpatient Surgeons, and is a founding member and past President of the Tennessee Society for Gastrointestinal Endoscopy. He has served as Chief of Staff at St. Mary's Medical Center, Knoxville. He is a past Trustee of the American Society of Internal Medicine. He has received numerous professional and civic awards including the distinction of being named Master by the American College and Physicians and the American College of Gastroenterology.

John M. Haydek, M.D., FACP, FACG, AGAF, FASGE

Dr. Haydek is a gastroenterologist at Gastrointestinal Associates, P.C. (GIA) in Knoxville, and the current Medical Director of the Center of Excellence. He joined the Center in 1995 to focus on endoscopic treatments for Barrett’s esophagus and early stage esophageal cancer. He has been a pioneer in application of new endoscopic treatments such as radiofrequency ablation using Through-the-Scope RFA catheter, HALO 360 Express catheter and a variety of Endoscopic Mucosal Resection techniques. Dr. Haydek is the Principal Investigator for several clinical studies for patients with Barrett’s Esophagus.

Dr. Haydek received a degree in pharmacy from the University of Illinois. He subsequently obtained his M.D. degree and completed his internship, medical residency, chief residency and gastroenterology fellowship at Loyola University Medical Center in Chicago. Following his fellowship and prior to his relocation to Knoxville, Tennessee, Dr. Haydek worked for three years as an academic gastroenterologist and Assistant Professor of Medicine at Loyola University Medical Center and Hines VA Hospital in Chicago.

Dr. Haydek’s accomplishments are extensive and include numerous research publications, multiple nominations for “Outstanding Teacher” awards and several “Top Physician” honors, both locally as well as nationally. In addition, he has attained the distinction of being appointed a Fellow of the four major medical organizations including the American College of Physicians (FACP), the American College of Gastroenterology (FACG), the American Gastroenterological Association (AGAF) and the American Society for Gastrointestinal Endoscopy (FASGE).

He has also served as Chief of the Medical Staff at Tennova (formerly Mercy Medical Center St. Mary’s), as Committee Chair of the Pharmacy and Therapeutics Committee and is dual board certified in both Internal Medicine and Gastroenterology.
Raj I. Narayani, M.D., FACP, FASGE

Dr. Narayani is a gastroenterologist at Gastrointestinal Associates, P.C. (GIA). He joined the Center in 2005 to focus on outpatient endoscopic treatments for patients with Barrett's esophagus and early esophageal cancer. He has extensive experience in application of lasers, radiofrequency ablation techniques as well as endoscopic mucosal resection. He was one of the first physicians in the country to use HALO 360 Express and Through-the-scope RFA catheters for treatment of Barrett's esophagus. Dr. Narayani obtained his undergraduate and medical degrees at Vanderbilt University. He completed his Internal Medicine Residency and Gastroenterology Fellowship at the San Antonio Uniformed Services Health Education Consortium in San Antonio, Texas. He then served as an academic Gastroenterologist at David Grant USAF Medical Center at Travis AFB, California for 4 years before joining GIA.

His 10-year military career included an overseas deployment as a Critical Care Aeromedical Physician during Operation Enduring Freedom, and was further highlighted by earning a Meritorious Service Medal in 2005.

Dr. Narayani has the distinction of being appointed a Fellow of the American College of Gastroenterology and the American Society for Gastrointestinal Endoscopy and a member of American Gastroenterological Association.

Masoud Panjehpour, Ph.D.

Dr. Panjehpour is the Director of Research and Operations at the Laser Center. He is also a Research Associate Professor at the College of Veterinary Medicine and holds a visiting scientist appointment at Oak Ridge National Laboratory. His collaborative work with the College of Veterinary Medicine and Oak Ridge National Laboratory has resulted in several human clinical studies including development of balloon photodynamic therapy and non-invasive detection of cancer using laser induced fluorescence spectroscopy. He lectures extensively on PDT and has published numerous papers and book chapters. He is a member of the American Society for Laser Medicine and Surgery, American Society for Photobiology, the International Society for Optical Engineering (SPIE) and the American Gastroenterological Association.

Dr. Panjehpour was the recipient of the Knoxville News Sentinel's Health Care Heroes "Innovation" Award in 2013.

Matthew Thomas, RN; Teresa Treadway, RN; Shelly Abrams, RN

Mr. Thomas, Ms. Treadway and Ms. Abrams are the Laser Center nurses who coordinate the day-to-day care of our patients. They provide individualized nursing assessment, prepare patients for endoscopic procedures, as well as assist the physicians during endoscopies. They also ensure that patients receive the required pre-procedure education and post procedure follow-up calls. They are trained in moderate sedation care, are Advance Cardiac Life Support (ACLS) certified and are considered experts in the nursing care of Barret's Patients. By teaming with Gastrointestinal Associates physicians and nurses we are able to provide excellent well-coordinated patient care.

Mary Ann Whitaker

Ms. Whitaker is the Project Coordinator for the Laser Center. She is often the first person patients encounter when they call our Center to discuss their treatment options. She helps direct their questions to the appropriate support staff and handles mailing out packets of information, collects patient records from referring physicians, assists insurance staff in obtaining pre-certs, and assists patients and their families making their visit as pleasant as possible. She is responsible for registering patients.

Jennifer Raney, LPN; Heather Summers, LPN

Ms. Raney and Ms. Summers both serve as part of the support team at Gastrointestinal Associates, P.C. They work in conjunction with the Laser Center staff to provide a well-coordinated day-to-day care for patients. They coordinate collection of patient records from referring physicians for review by the doctors and handle scheduling patients at GIA and the Laser Center.
Kathy Karnes, RN, BSN

Ms. Karnes is the Quality Director and Clinical Research Coordinator at Gastrointestinal Associates, P.C. She has been the study coordinator for several studies for diagnosis and treatment of Barrett's esophagus. She and her staff coordinate data collection and reporting for all studies conducted at GIA.

Wanda Witt, Linda Edwards, Gordon Ball

Ms. Witt, Ms. Edwards and Mr. Ball work at the Fellowship Center, the free housing for out-of-town patients. They coordinate housing and transportation for patients coming to Knoxville for their treatments and follow-up endoscopies.

Nedra Cook

Ms. Cook is the librarian at the Medical/Nursing Research Library, located on the 3rd floor of Thompson Cancer Survival Center. She assists the medical staff in conducting searches for research articles in medical journals.

Robert C. DeNovo, D.V.M., M.S., D.A.C.V.I.M.

Dr. DeNovo is a Professor & Head of Department of the Small Animal Clinical Sciences at the College of Veterinary Medicine, University of Tennessee, and a Diplomate of the American College of Veterinary Medicine. He has been involved with the PDT program since 1989, when the preclinical research was initiated at the PDT Laboratory at the College of Veterinary Medicine. He has been instrumental in development of the animal studies and contributed to evaluation of light delivery devices currently in human use.

Alfred M. Legendre, D.V.M., D.A.C.V.I.M.

Dr. Legendre is a Professor of Medicine at the College of Veterinary Medicine at University of Tennessee. He is the chief of medical oncology at the small animal clinic. Dr. Legendre is a Diplomate of the American College of Veterinary Internal Medicine. He has been involved with veterinary application of lasers and PDT for treatment of client-owned animals at the small animal clinic.
Publications by Our Staff

Listed in reverse chronological order.

The Effect of Reactive atypia/Inflammation on the Laser-Induced Fluorescence Diagnosis of Non-dysplastic Barrett’s Esophagus
Panjehpour M, Overholt BF, Vo-Dinh T, Coppola D.

Photodynamic therapy in the gastrointestinal tract.
Panjehpour M and Overholt BF.

Durability of Radiofrequency Ablation in Barrett’s Esophagus With Dysplasia

Detection of dysplasia in Barrett’s esophagus with in vivo depth-resolved nuclear morphology measurements

Does Ablative Therapy for Barrett Esophagus Affect the Depth of Subsequent Esophageal Biopsy as Compared With Controls?
Bergein F. Overholt, MD, Patrick J. Dean, MD, Joseph A. Galanko, PhD, and Charles J. Lightdale, MD
Journal of Clinical Gastroenterology, May 18, 2010

The Case for Endoscopic Treatment of Non-dysplastic and Low-Grade Dysplastic Barrett’s Esophagus
March 22, 2010, PubMed

Photodynamic therapy for Barrett’s esophagus
Panjehpour M and Overholt BF.

Radiofrequency Ablation in Barrett’s Esophagus with Dysplasia
Nicholas J. Shaheen, M.D., M.P.H., Prateek Sharma, M.D., Bergein F. Overholt, M.D.
The New England Journal of Medicine 2009

Photodynamic Therapy of Barrett’s Esophagus: Ablation of Barrett’s Mucosa and Reduction in p53 Protein Expression after Treatment.
Panjehpour M, Coppola D, Overholt BF, Vo-Dinh T, Overholt S.

Squamous Overgrowth Is Not a Safety Concern for Photodynamic Therapy for Barrett's Esophagus with High-Grade Dysplasia.
In: Gastroenterology, Volume 136, Issue 1, Pages 56-64, January 2009

Endoscopic ablation of Barrett’s esophagus: a multicenter study with 2.5-year follow-up.
In: Gastrointest Endosc. 2008 Nov;68(5):867-76

Five-year efficacy and safety of photodynamic therapy with Photofrin in Barrett’s high-grade dysplasia.
In: Gastrointest Endosc. 2007 Sep;66(3):460-468.

Balloon-based, circumferential, endoscopic radiofrequency ablation of Barrett’s esophagus: 1-year follow-up of 100 patients.

Porfimer Sodium Photodynamic Therapy for Management of Barrett’s Esophagus with High Grade Dysplasia
Masoud Panjehpour, Bergein F. Overholt.
Photodynamic Therapy for Barrett's High-Grade Dysplasia
Overholt BF, Panjehpour M, Phan M.
Lippincott Williams & Wilkins, 2005.

An Educational Tool for Photodynamic Therapy of Barrett's Esophagus with High-Grade Dysplasia: From Screening through Follow-up
Phan M, Dyke S, Whittaker MA, Simmerman A, Abrams S, Panjehpour M, Overholt BF.
Gastroenterology Nursing
2005 September/October; 28(5): 413-419

Photodynamic therapy with porfimer sodium for ablation of high-grade dysplasia in Barrett's esophagus: international, partially blinded, randomized phase III trial.
Gastrointestinal Endoscopy

Panjehpour M, Overholt BF, Phan MN, Haydek JM.
Gastrointestinal Endoscopy
2005 Jan;61(1):13-8

What is the best management strategy for high grade dysplasia in Barrett's esophagus? A cost effectiveness analysis.
Shaheen NJ, Inadomi JM, Overholt BF, Sharma P. Gut
2004 Dec;53(12):1734-44

Development of a fluorescence detection system using optical parametric oscillator (OPO) laser excitation for in vivo diagnosis.
Song JM, Jagannathan R, Stokes DL, Kasili PM, Panjehpour M, Phan MN, Overholt BF, DeNovo RC, Pan X, Lee RJ;Vo-Dinh T.
Technol Cancer Res Treat
2003 Dec;2(6):515-23

Photodynamic Therapy for Barrett's Esophagus with Dysplasia and/or Early Stage Carcinoma: Long Term Results
Overholt BF, Panjehpour M, Halberg B
Gastrointestinal Endoscopy
2003; 58(2):183-8

Therapeutic Applications of Lasers in Gastroenterology
Panjehpour M, Overholt BF.
Biomedical Photonics Handbook, Chapter 46, CRC Press, 2003

Photodynamic Therapy Using Verteporfin (benzoporphyrin derivative monoacid ring A, BPD-MA) and 630 nm Laser Light in Canine Esophagus
Panjehpour M, DeNovo RC, Petersen MG, Overholt BF, Bower R, Rubinchik V, Kelly B.
Lasers in Surgery and Medicine
2002;30(1):26-30

Acid Suppression and Reepithelialization After Ablation of Barrett's Esophagus
Overholt BF.
Digestive Diseases

Evaluating Treatments of Barrett's Esophagus That Shows High-Grade Dysplasia
Overholt BF.
American Journal of Managed Care
2000 Oct;6(16 Suppl):S903-8

Laser-Induced Fluorescence Spectroscopy for in vivo Diagnosis of Nonmelanoma Skin Cancers
Panjehpour M, Julius CE, Phan MN, Vo-Dinh T, Overholt S.
Lasers in Surgery and Medicine
2002;31(5):367-73

Results of Photodynamic Therapy for Ablation of Dysplasia and Early Cancer in Barrett's Esophagus and Effect of Oral Steroids on Stricture Formation
Panjehpour M, Overholt BF, Haydek JM, Lee SG.
American Journal of Gastroenterology
2000 Sep,95(9):2177-84
Light Sources and Delivery Devices for Photodynamic Therapy in the Gastrointestinal Tract
Panjehpour M, Overholt BF, Haydek JM.
Gastrointestinal Endoscopy Clinics of North America
2000 Jul;10(3):513-32

Photodynamic Therapy in the Management of Barrett's Esophagus With Dysplasia
Overholt BF, Panjehpour M.
Journal of Gastrointestinal Surgery
2000 Mar-Apr;4(2):129-30

Results of Photodynamic Therapy in Barrett's Esophagus: A review
Overholt BF.
Canadian Journal of Gastroenterology
1999 Jun;13(5):393-6

Photodynamic Therapy for Barrett's Esophagus: Follow-up in 100 Patients
Overholt BF, Panjehpour M, Haydek JM.
Gastrointestinal Endoscopy
1999 Jan;49(1):1-7

Photodynamic Therapy in Barrett's Esophagus
Overholt BF, Panjehpour M.
Journal of Clinical Laser Medicine & Surgery

Laser-induced Fluorescence for Esophageal Cancer and Dysplasia Diagnosis
Vo-Dinh T, Panjehpour M, Overholt BF.
Annals of the New York Academy of Sciences
1998 Feb 9;838:116-22

Photodynamic Therapy for Barrett's Esophagus: Cardiac Effects
Overholt BF, Panjehpour M, Ayres M.
Lasers in Surgery and Medicine
1997;21(4):317-20

Photodynamic Therapy for Barrett's Esophagus
Overholt BF, Panjehpour M.
Gastrointestinal Endoscopy Clinics of North America
1997 Apr;7(2):207-20

Photodynamic Therapy for Barrett's Esophagus: Clinical Update
Overholt BF, Panjehpour M.
American Journal of Gastroenterology
1996 Sep;91(9):1719-23

Endoscopic Fluorescence Detection of High-Grade Dysplasia in Barrett's Esophagus
Panjehpour M, Overholt BF, Vo-Dinh T, Haggitt RC, Edwards DH, Buckley FP III.
Gastroenterology

Balloon Photodynamic Therapy of Esophageal Cancer: Effect of Increasing Balloon Size
Overholt BF, Panjehpour M, DeNovo RC, Peterson MG, Jenkins C.
Lasers in Surgery & Medicine
1996;18(3):248-52

Photodynamic Therapy With Porfimer Sodium Versus Thermal Ablation Therapy With Nd: YAG Laser for Palliation of Esophageal Cancer: a Multicenter Randomized Trial
Lightdale CJ, Heier SK, Marcon NE, McCaughan JS Jr, Gerdes H, Overholt BF, Sivak MV Jr, Stiegmann GV, Nava HR.
Gastrointestinal Endoscopy
1995 Dec;42(6):507-12

Photodynamic Therapy in Barrett's Esophagus: Reduction of Specialized Mucosa, Ablation of Dysplasia, and Treatment of Superficial Esophageal Cancer
Overholt BF, Panjehpour M.
Seminars in Surgical Oncology
1995 Sep-Oct;11(5):372-6
Barrett’s Esophagus: Photodynamic Therapy for Ablation of Dysplasia, Reduction of Specialized Mucosa, and Treatment of Superficial Esophageal Cancer
Overholt BF, Panjehpour M.
Gastrointestinal Endoscopy
1995 Jul;42(1):64-70

Spectroscopic Diagnosis of Esophageal Cancer: New Classification Model, Improved Measurement System
Panjehpour M, Overholt BF, Schmidhammer JL, Farris C, Buckley PF, Vo-Dinh T.
Gastrointestinal Endoscopy
1995 Jun;41(6):577-81

In Vivo Cancer Diagnosis of the Esophagus Using Differential Normalized Fluorescence (DNF) Indices
Vo-Dinh T, Panjehpour M, Overholt BF, Farris C, Buckley FP 3rd, Sneed R.
Lasers in Surgery & Medicine
1995;16(1):41-7

Photodynamic Therapy for Esophageal Cancer Using a 180 Degrees Windowed Esophageal Balloon
Overholt BF, Panjehpour M, DeNovo RC, Petersen MG.
Lasers in Surgery & Medicine
1994;14(1):27-33

Tumor Cell-Enhanced Sensitivity of Vascular Endothelial Cells to Photodynamic Therapy
Yang Z, Lu X, Frazier DL, Panjehpour M, Breider MA.
Lasers in Surgery & Medicine

A Centering Balloon for Photodynamic Therapy of Esophageal Cancer Tested in a Canine Model
Overholt BF, DeNovo RC, Panjehpour M, Petersen MG.
Gastrointestinal Endoscopy
1993 Nov-Dec;39(6):782-7

Comparative Study Between Pulsed and Continuous Wave Lasers for Photofrin Photodynamic Therapy
Panjehpour M, Overholt BF, DeNovo RC, Petersen MG, Sneed RE.
Lasers in Surgery & Medicine
1993;13(3):296-304

Photodynamic Therapy for Treatment of Early Adenocarcinoma in Barrett’s Esophagus
Overholt B, Panjehpour M, Tefftellar E, Rose M.
Gastrointestinal Endoscopy
1993 Jan-Feb;39(1):73-6

Quantification of Phthalocyanine Concentration in Rat Tissue Using Laser-Induced Fluorescence Spectroscopy
Panjehpour M, Sneed RE, Frazier DL, Barnhill MA, O’Brien SF, Harb W, Overholt BF.
Lasers in Surgery & Medicine

Cytokine Modulation of Endothelial Cell Sensitivity to Photodynamic Therapy
Breider MA, Lu X, Panjehpour M, Frazier DL.
Lasers in Surgery & Medicine
1993;13(3):305-11

Comparative Pharmacokinetics of the Photosensitizer Tin-Etiopurpurin in Dogs and Rats
Frazier DL, Barnhill MA, Vo-Dinh T, Legendre AM, Overholt BF.
Journal of Veterinary Pharmacology and Therapeutics
1992 Sep;15(3):275-81

Laser and Photodynamic Therapy of Esophageal Cancer
Overholt BF.
Seminars in Surgical Oncology

Centering Balloon to Improve Esophageal Photodynamic Therapy
Panjehpour M, Overholt BF, DeNovo RC, Sneed RE, Petersen MG.
Lasers in Surgery & Medicine

https://www.thompsoncancer.com/barretts/publications-by-our-staff/
Nd:YAG Laser Hyperthermia Treatment of Rat Mammary Adenocarcinoma in Conjunction With Surface Cooling
Panjehpour M, Wilke AV, Frazier DL, Overholt BF.
Lasers in Surgery & Medicine
1991;11(4):356-62

Nd:YAG Laser-Induced Hyperthermia Treatment of Spontaneously Occurring Veterinary Head and Neck Tumors
Panjehpour M, Overholt BF, Frazier DL, Klebanow ER.
Lasers in Surgery & Medicine

Nd:YAG Laser-Induced Interstitial Hyperthermia Using a Long Frosted Contact Probe
Panjehpour M, Overholt BF, Milligan AJ, Swaggerty MW, Wilkinson JE, Klebanow ER.
Lasers in Surgery & Medicine
1990;10(1):16-24

Blood Flow Values
Milligan AJ, Panjehpour M.
International Journal of Radiation Oncology, Biology, Physics
1988 May;14(5):1056-7

Laser Treatment of Esophageal Cancer
Overholt BF.
American Journal of Gastroenterology
1985 Sep;80(9):719-20

Canine Normal and Tumor Tissue Estimated Blood Flow During Fractionated Hyperthermia
Milligan AJ, Panjehpour M.
International Journal of Radiation Oncology, Biology, Physics
1985 Sep;11(9):1679-84

Laser Treatment of Upper Gastrointestinal Hemorrhage
Overholt BF.
American Journal of Gastroenterology
1985 Sep;80(9):721-6

The Relationship of Temperature Profiles to Frequency During Interstitial Hyperthermia
Milligan AJ, Panjehpour M.
Association for the Advancement of Medical Instrumentation
1983 Jul-Aug;17(4):303-6
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