**History of Gastroenterology in Lancaster County**

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Dr. Edward Hand, Adjutant General for George Washington’s Revolutionary army, was a practicing physician in Lancaster County, but he was also a farmer which in some sense connects us to the special field of gastroenterology. (1) For it was the produce of this and bordering counties that sustained the ensconced colonial troops at Valley Forge during that terrible winter of 1776. Without nutrition, food for the digestive system to utilize, the revolution would have been lost due to starvation. Lancaster County has been a veritable haven for the human GI tract by providing a wide variety of aromas, sweet baked goods (locally dubbed “schleck”) as well as many nutritious foods that continue to this day to draw visitors from far and wide to its succulent tables. So the nutritional aspects of gastroenterology began with the county’s earliest farming history.

**Gastroenterology in Western Medicine**

Gastroenterology (GI) is the discipline within Internal Medicine that deals with the ingestion, digestion, utilization and elimination of that which we eat. The GI tract includes the mouth and tongue, esophagus, stomach, small and large bowel, along with side organs of salivary glands, liver, biliary and pancreatic systems (which provide digestive chemicals). The end products of digestion finally enter the rectum for elimination. The food we eat never really enters our body cavity, per se, but simply passes through these enteric tubes. The gut permits us to enjoy the tastes and the usually satisfying sensations of satiety and elimination. However, the mysteries of assimilation and inter-working of organs even now are not fully understood. The gastroenterologist (GE) then is that specialist who devotes his time and talents to unravel this mystery and defines and treats the various diseases that affect these organs.

The history of Gastroenterology in Lancaster County parallels its development in the western world. The first formal organization that centered its attention upon the GI tract was the American Gastroenterological Association (AGA), organized in 1897. (2) It operates to this day, holding its annual meetings each May where more than 8000 attend including medical as well as surgical specialists. During the first 50 years, membership grew steadily. A more clinically oriented organization, the American College of Gastroenterology (ACG), was later organized to oversee the training and accreditation of GE’s. Further sub-groups within this discipline include the American Society for Gastrointestinal Endoscopy (ASGE), the American Association for the Study of Liver Diseases (AASLD), and others.

Prior to World War II most physicians other than surgeons considered themselves “generalists.” But thereafter, the number of medical specialists in every field grew rapidly, and gastroenterology followed this trend. At universities, training programs in cardiology, allergy, pulmonary disease, and rheumatology as well as gastroenterology were formed. These programs expanded to meet the demand. These divisions were all part of the larger “Internal Medicine” discipline. Gastroenterology never included surgery as part of the necessary training to enter the specialty. In the 1950’s, the required training beyond four years of medical school included one year of internship, three years of general internal medicine, then one to two years of a fellowship in gastroenterology. Gastroenterology training emphasized hospital care. Outpatient care was for many years minimized. Hospital admission was often a part of a complete evaluation. For an undiagnosed illness the necessary x-rays and other studies could be done promptly with more frequent observation of the patient’s progress than could be accomplished as an outpatient. Of course, over the years as costs increased, this practice of admission to the hospital for tests was discontinued.

The GI medical evaluation prior to the era of endoscopy centered around symptom evaluation, x-ray studies using barium suspensions in the upper and lower intestine, gastric acid analysis from NG tubes and finally, blind biopsies of stomach, duodenum and liver by wire controlled flexible forceps, suction devices or blind needle biopsies. Most GE’s were also generalists and would treat a wide variety of other diseases. Main treatments for GI problems centered around antacids for acid peptic disease, belladonna for irritable bowel syndrome, cascara and mineral oil for constipation, or codeine extract for diarrhea.

Before 1960 the only procedures performed by most gastroenterologists were procto-sigmoidoscopy, liver biopsy, small bowel biopsy and gastric analysis. However, research in the field occurred early and lead to many improved techniques that demonstrate the anatomy and function of the GI tract in health and disease. Walter B. Cannon in the early twentieth century pioneered the use of oral contrast agents to define anatomy and physiology of the GI tract in health and disease. (3) During the last two decades of the 20th century computerized tomography and magnetic resonance imaging techniques were invented, applied to demonstrate cross sectional intestinal anatomy and progressively improved to become essential tools to identify and treat GI illnesses.(4,5)

In the 19th century Adolph Kussmaul first attempted to visualize the esophagus and stomach by passing a straight tube into the mouth and esophagus of a “sword swallower.” A more refined and illuminated tube developed by Eder and Hufford allowed fairly clear visualization of the esophagus.(6) Later, in 1932, Rudolf Schindler devised a semi flexible tube with a side-viewing lens to see parts of the stomach lining. This instrument consisted of a series of mirrors and lenses that allowed a very limited ability to see beyond the direct line of vision. (7)

Then in the 1960’s the field was transformed with the invention of flexible fiber optic endoscopy and GI, as we know it today, expanded rapidly thereafter. Hirschowitz developed the first successful flexible esophagoscope in 1958. (8,9) Japanese optical companies improved this technology introducing their endoscopes into the USA in 1970. Colonoscopy\*, invented in 1963, (10,11) and upper endoscopy\*\* inspired the rapid development of training programs that sprang up around the country as the field drew more and more applicants to train in GI. The first endoscopic retrograde cholangiopancreatography (ERCP)\*\*\* was reported in Japan. (12) Dr. Frederick Saunders performed the first ERCP\*\*\* in Western USA in 1972. He also wrote one the earliest reports in the USA of endoscopic removal of a CBD stone in 1975. (13) Thereafter, he developed advanced techniques for CBD stone removal in the 1970’s, bringing this experience to Lancaster County in 1990. Dr. Mark Johnston invented a method to cure Barrett’s Esophagus with dysplasia or carcinoma using liquid nitrogen sprayed through the upper endoscope. (14) He brought that technique to Lancaster county in 1975. Endoscopic ultrasound (EUS)\*\*\*\* developed in the 1980’s, permits the visualization, aspiration, biopsy and drainage of the interior of masses within the gut lumen as well as structures outside the lumen such as masses, cysts, lymph nodes, neural ganglia, and ductal structures. (15)

**Gastroenterology in Lancaster County**

In Lancaster County the specialty started in the 1940’s because surgeons in the Atlee group (Drs. John and William and others) desired to have a “medical” specialist evaluate their patients. They hired Dr. Henry Walter to join them. Soon thereafter, in 1948, Dr. John Helm (trained at Harvard) came back to Lancaster. However, endoscopy with flexible instruments had not yet been invented and the passage of solid pipes from above was a specialty only done in major medical centers, mainly by surgeons who also performed sigmoidoscopy.

Prior to the field of fiberoptic endoscopy, a procedure called “gastric freezing” was developed to control acid release in the stomach. Dr. Tom Davis from Ephrata brought this technique to Lancaster County whereby he passed a tube through the mouth into the stomach. Freezing water was pumped into and out of the gastric tube. However, this controlled acid production for only 6-8 months and thus, was eventually discarded in favor of antacids and medications.

The earliest flexible gastroscope (from ACMI) was purchased in the late 1960’s by the then St. Joseph Hospital (now the Lancaster Regional Medical Center) and was used by Dr. James (Fred) Young trained by Dr. Henry Bockus from Philadelphia. He began his practice in Lancaster in 1960. During his first 10 years he did not limit his practice to gastroenterology. Shortly thereafter, in 1971, Dr. David Weston brought endoscopy to the Lancaster General Hospital, having been trained by Dr. Leslie Zieve and Dr. Jack Vennes at the University of Minnesota. After Dr. Weston arrived, he and Dr. Young concentrated their practice in gastroenterology. Dr. Weston performed the county’s first colonoscopy on 1972 and the first colonoscopic polypectomy in 1973. Endoscopy flourished with the addition of the ERCP in which the biliary tree could be visualized and treated by stone removal, biopsy, dilation and stenting. Dr. Rick Altman joined Weston and Young in 1979 bringing ERCP skills to the county. He performed the county’s first CBD stone extraction in 1983. Dr. Pokorney joined in 1981. Dr. Lazarus started a second group in 1984 and recruited Drs. Elkin and Whitebloom. This group extended coverage to the Osteopathic, Ephrata and Columbia hospitals. Dr. Mark Johnston invented the technique of transendoscopic cryotherapy (the use of liquid nitrogen spray to freeze and destroy diseases tissue lining) in the early 1990’s while serving as chief of Gastroenterology at Bethesda Naval Hospital. Following retirement from the Navy he brought this technique to Lancaster in 2005 when he joined Dr. Weston’s group, Lancaster Gastroenterology, Inc., creating the first non-university private practice in the US to employ this therapy for cure of Barrett’s esophagus and esophageal cancer. (14,16) Endoscopic ultrasound (EUS) was developed in the early 1980’s but first introduced into Lancaster by Dr. Kilkarny in 2010. He also brought to the County radiofrequency ablation (RFA) that uses heat generated by radiowaves for treatment of Barrett’s Esophagus. Dr. David Horwhat brought additional advanced EUS therapeutic methods in 2014.

The groups divided with subsequent merger of the osteopathic physicians, Drs. Lazarus, Elkin and Whitebloom, joining Young, Foley, Altman and Rosenberg and Lomboy to form Regional Gastroenterology Associates of Lancaster (RGAL). Dr. Weston recruited Dr. Frederick Saunders joined by Dr. Steve Chen to form Lancaster Gastroenterology, Inc. (LGI). From the mid 1990’s through 2014 RGAL added Drs. Gibas (the first female gastroenterologist), Colton, Connell, Devenyi (Pediatric GI), Kulkarni, Lalani, Smith, Cheshty and Shih. During the same interval LGI added Drs. Parikh, Johnston, Allegretti, Harberson, Farrell, Morgan and Horwhat. So currently, there are 27 boarded GE’s with three having retired (Drs. Weston, Young and Saunders).

Ben Lazarus, DO recalls the beginning of GI coverage at Ephrata Community Hospital: “In August of 1984, I was approached by Richard Mellinger, Norman Axelrod, and Larry Scanlon, who was then the president of Ephrata Community Hospital (ECH). I received my immediate temporary privileges at ECH. Previously, GI coverage was on an intermittent basis provided by a Reading GI group, Drs. Levy and Chaudry. Within one month of my obtaining staff privileges at ECH, a full-service gastroenterology division was established at the hospital. It was during that year that I performed the first ERCP at ECH.”

“In 1986, Rick Elkin joined my practice and we became Regional Gastroenterology Associates (RGA). During 1986, Rick performed the first ERCP with a stone extraction at ECH. RGA continued to flourish and Dale Whitebloom joined the practice in 1990. In 1990, ECH built a single-purpose endoscopy suite in its short stay unit. Subsequently, in 1993 RGA merged with Gastroenterology Associates of Lancaster (GAL) to form RGAL.”

“Today, RGAL is a group of 17 providers, 15 physicians and 2 nurse practitioners. The group, in all of its iterations beginning with me as a solo practitioner of GI in 1984, has been providing uninterrupted GI service to ECH and the surrounding community for 30 years.”

Lancaster Gastroenterology began with Drs. Weston in 1971. He was joined by Saunders (1990) and Chen (1992) and subsequent colleagues developed an incorporated GI practice (LGI) with a declared mission to provide outcome excellence in three principle spheres:

1. *Clinical GI skills* with an added focus upon spiritual needs of patients. This was exemplified by recruiting physicians with nationally recognized excellence in ERCP and therapeutic EUS, Cryotherapy and Barrett’s esophagus with dysplasia,

2. *A commitment to teaching* not only their patients but also the resident physicians of Lancaster General Family Medicine. This has been acknowledged by the Program, which on four occasions awarded Dr. Chen and/or LGI the teacher and/or teaching group of the year. In addition, LGI with LGH has offered county practitioners an annual CME accredited lecture program developed by Dr. Allegretti.

3. *Emphasis upon research and publication*. Members of LGI have participated in national drug trials, published multiple papers and presented scientific abstracts at national meetings. Research has included numerous papers, abstracts and case reports on diverse topics such as endoscopic cryotherapy (14,16,17), endoscopic management of perforation, primary biliary cirrhosis (18) and markedly enhanced detection of colon polyps by training all personnel in the endoscopy suite to identify polyps. (19)

LGI pioneered the use of specialty midlevel providers in GI beginning in 1997 (see below). They expanded their practice to include both physicians and multiple midlevel providers making a total sixteen providers performing consultative care

The two groups, LGI and RGAL, plan to merge into a single practice in 2017.

Many practices in the US include the addition to the GI team of specialty trained nurse practitioners and physician assistants, also called midlevel providers (MLP) or “doctor extenders.”. Practices employ these Mid-level providers in many ways: they screen patients who should have endoscopy but are otherwise healthy and who have a family history of GI cancer, manage all aspects of those patients undergoing treatment for Hepatitis C, and conduct genetic counseling for certain known familial syndromes such as familial polyposis, inflammatory bowel disease or gluten enteropathy. Under the supervision of board certified gastroenterologists these mid level providers (MLP) here and across the nation now perform complete consultation and counseling in a growing number of GI offices

**The Impact of Gastroenterology Research and Development**

There have been some remarkable advances in the practice of gastroenterology in the past 50 years that have revolutionized GI practice throughout the western world as well as that of Lancaster County. (20) For many years studies to visualize the gastrointestinal tract depended on x-rays combined with barium contrast material. These were significantly limited at finding pathology such as ulcers, polyps or tumors in the stomach, duodenum or colon and now are infrequently used because of inaccuracy and lack of therapeutic ability. But with the new endoscopes these abnormalities could be seen directly with much higher accuracy rates. A wire was passed through the instruments in order to obtain biopsies when necessary. Bleeding sources were seen which could not be identified on x-rays. Bleeding ulcers could be injected, cauterized or clipped to stop the bleeding thereby avoiding an operation. Early tumors of the esophagus or stomach could be detected and if found early, treated for cure with cryotherapy, thermal therapies (RFA) and endoscopic mucosal resection or simply stented for palliation. Endoscopic ultrasound, developed in the mid 1980’s, has flourished into an endoscopic subspecialty that allows many new diagnostic and therapeutic methods. These include trans mucosal biopsies of lymph nodes, extra intestinal tumors and focal ascites and the drainage of pancreatic cysts and abscesses. Upper G.I. endoscopy opened a whole new world of diagnosis and treatment of the upper intestinal tract.

ERCP allowed the injection of liquid contrast into the ducts of the biliary tract and pancreas. This technique could detect, biopsy and stent cancer in the bile ducts and pancreas, remove gallstones. This technique eliminated the need for laparotomy in most cases. Colonoscopy made an enormous change in the practice of gastroenterology. Colon cancer had always been an important disease and early diagnosis was always the goal for the gastroenterologist. It soon replaced sigmoidoscopy and barium enema in that many research studies showed its superior accuracy and efficacy in finding and curing cancer and polyps, the precursor to most colon cancer. This is essentially the reason for the growth in use of colonoscopy. Studies showed that indeed there was a reduced incidence of colon cancer in patients who had polyps removed. Routine colonoscopy for cancer screening for persons over age 50 became the standard of care. This in turn resulted in an explosion in the demand for the procedure. More gastroenterologists were needed, as were more efficient and economical facilities, which prompted creation of new freestanding endoscopy units to perform these services at competitive, cost-saving rates.

Helpful ancillary techniques available locally include motility measurements of the esophagus and stomach, breath tests to clarify varying types of malabsorption including bacterial overgrowth of the small intestine, culture and microscopic methods to identify infections of the intestine and “capsule endoscopy” to examine the small intestine for bleeding and neoplastic lesions. The latter technique utilizes a capsule with a battery driven flash camera and transmitter relaying thousands of sequenced photographs to a receiver for computer analysis of the intestine.

Pharmacologic research with an emphasis upon double blind clinical trials has led to a revolution in management of GI diseases. (20) In the 1950’s and ‘60’s, the diagnosis of peptic ulcer disease was made by the patient’s history and confirmed with barium contrast x-rays. Treatment was centered on diet supplemented by frequent doses of antacids and the Sippy diet, the latter shown to be ineffective in controlled trials in the 1970’s. Failure to heal often resulted in surgery to remove a portion of the stomach and sever the vagus nerve that supplied the stomach and was responsible for the secretion of acid. Bleeding from an ulcer frequently resulted in surgery as the only method to stop the bleeding. Ulcer surgery was a large part of a general surgeon’s practice during those years.

It was known for many years that the stomach secreted hydrochloric acid and that acid was necessary for the formation of peptic ulcers. Research therefore emphasized methods to prevent the stomach from secreting acid. Histamine is necessary to stimulate the gastric cells to form acid. But ordinary antihistamines do not prevent acid formation. The scientists at SmithKline laboratories found a different type of receptor in the gastric cell that they called an H2 receptor

The search then centered on a substance that would block that receptor. (21) They developed Cimetidine (trade name of Tagamet) which was the first drug of its type to markedly suppress acid secretion in the stomach. This was first marketed in the United Kingdom in 1976, and was a major breakthrough in the treatment of ulcer disease. Thereafter, scientists developed other more potent acid suppressant drugs called proton pump inhibitors (PPI’s), named because of the location on the gastric cells where their action took place. These drugs revolutionized the treatment of reflux esophagitis and peptic ulcer, nearly eliminating the need for surgical intervention in these diseases.

This was not the end of the ulcer story. In 1982, Drs. Barry Marshall and Robin Warren of Perth, Australia, found a bacterium, later known as Helicobacter pylori, in the stomach and demonstrated that this organism was responsible for gastritis and ulcer disease. (22,23) This was revolutionary in the field of gastroenterology. Drs. Marshall and Warren received the Nobel Prize in medicine for their work. In 1987, Dr. Thomas Borody showed that triple antibiotic therapy was useful in the treatment of duodenal ulcers. In 1994, our National Institute of Health stated that many ulcers were caused by H. pylori and that antibiotics were useful in their treatment.

Ulcerative colitis and Crohn’s disease, often severely disabling, can now be managed successfully with modern development of “biologic therapy.” These agents are laboratory-generated antibodies against antitumor necrosis factor (antiTNF), but other cell-mediated therapies are also available or in development. (24)

The treatment of liver disease in Lancaster has followed the national trends. Two types of hepatitis were known at the time of World War II. They were ordinary infectious hepatitis and serum hepatitis. The latter was known to be transmitted by blood or infected needles or serum. These are now known as Hepatitis A and B. The incidences of these have decreased markedly over the years due to available vaccines and careful screening of transfusion products and the use of disposable needles. Now Hepatitis C is more prevalent. This infection is a long-term chronic illness. Many patients are helped by antiviral therapy, but Hepatitis C remains a leading cause of end stage liver disease and the need for liver transplantation. Modern antiviral therapy can now cure the majority of hepatitis C patients.

Liver transplantation has been the most dramatic therapy to be developed in the past 50 years. A program for transplantation has never been developed here, but we have always had cooperation with transplant centers in Pittsburgh, Philadelphia and Hershey. Dr. Starzl in Denver performed the first liver transplant. (25) The first one-year survivor occurred in 1967. By the 1970’s, the one-year survival was 25%. Now it is about 80%. Hepatitis C remains the most common cause for liver transplant but soon that will change as its prevalence recedes over the next decade.

There are many disorders of the gastrointestinal tract not mentioned here, including various tumors, both benign and malignant. Progress has been rapid, especially over the past 30 years. Many of these illnesses require a team approach involving the primary care physician, gastroenterologist, surgeon, and oncologist in order to provide the best care.

The major change in the practice of gastroenterology has been the shift from a specialty centered on diagnosis with limited choices of medical therapy to one characterized by many therapeutic endoscopic procedures with a wide variety of pharmacologic interventions. The modern GE is now able to perform technical interventions and apply pharmacologic remedies unheard of 20 years ago as outlined above. Finally, for less remedial disorders such as irritable bowel syndrome (IBS) unimproved by dietary and pharmacological protocols, the GE remains a “listening ear” for the patient and his family whose concerns need to be heard.

**Expectations for Future Development in Gastroenterology**

The challenges for the future are many but finding a cause and cure for ulcerative colitis and regional enteritis, and the never-ending search for the causes and cure of gastrointestinal malignancies are perhaps the most urgent at this time. Understanding the “microbiome” of the gut, its contribution to systemic as well as GI disease and the effect of diet and environment upon our health and diseases will have a major impact upon GI in the near future. Medicine, including GI, is on the verge of revolutionary genetic and epigenetic modifications to manage and/or prevent illnesses. Rapid change remains inevitable

Therefore, one can see that Lancaster County is indeed an ideal “bread basket” to produce a wide variety of food products from its soil and from its cows, hogs and poultry. We even have sophisticated chefs as well as “down-home cooks” who prepare all of this for us to savor the nutritional bounty of our county. But when disease of the intestine threatens, we have an expert range of gastroenterology talent and methods available to restore GI health in order to maximally enjoy the culinary gifts bestowed by our Lancaster home.

* **\*Colonoscopy** consists of passing a flexible lighted optic device into a previously cleansed colon in order to visualize and often treat lesions within the reach of the endoscope.
* **\*\*Gastroscopy** uses a similar device to examine and treat lesions in the esophagus, stomach and duodenum.
* **\*\*\*Endoscopic Retrograde Cholangiopancreatography (ERCP)** uses a similar device modified with a side viewing lens that permits the passage of tubes and operating devices into the bile and pancreatic ducts. **Sphincterotomy** consists of passing an electrified wire into the circular muscle in order to cut the sphincter muscle and gain access to treat lesions in the ducts such as tumors, stones and strictures.
* **\*\*\*\*Endoscopic Ultrasound (EUS)** employs a gastroscope modified with an added ultrasound device that generates and detects reflections from sound waves, creating a computerized image of the internal anatomy of lesions within as well as exterior to the wall of the intestine. Lesions can then be targeted for immediate biopsy, aspiration, or drainage as required.

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Advance care planning is a critical problem that continues to demand our attention and concern b

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