Keynote Address: Dr Douglas Wilmore, A.S.P.E.N. Pioneer

Written by Jill Shuman

Douglas W. Wilmore, MD, Prof Emeritus, Harvard Medical School, Boston, Massachusetts, USA—a pioneer in the field of clinical nutrition, the early use of glutamine administration to improve gut absorption, and the coordination of multidisciplinary intestinal failure nutrition teams—delivered the conference keynote address. His address delved into the problems related to patients with short bowel syndrome (SBS) and challenged practitioners and researchers to keep advancing the field and improving patient outcomes.

SBS is a malabsorption disorder caused by surgical removal of the small intestine. Dr Wilmore recalled early cases from his surgical training that focused his interest on factors that help the gastrointestinal (GI) tract adapt to deficiencies in nutrient absorption. A key factor in this adaptation was the development of parenteral nutrition (PN). He referred to data suggesting that 90% of people with at least 3 ft of bowel could live up to 10 years following bowel resection; however, survival declined to < 60% over the same time frame in patients with < 3 ft of bowel [Messing B et al. *Gastroenterology*. 1999]. According to Dr Wilmore, these patients are the ones who should be targeted for improvement in survival, and he challenged the audience to think about implementing changes that might increase survival to at least 90% in this group of patients.

The adult GI tract is about 27 ft long. At one end is the small bowel, comprising the duodenum, the jejunum, and the ileum (22.5 ft); at the other end is the colon (5 ft), separated from the small bowel by the ileocecal valve. While many practitioners do not include the duodenum when they discuss the length of the small bowel, Dr Wilmore suggested that they should. He cited 1960s Scandinavian studies showing that 80% of infused nutrients were absorbed in the first 2 to 3 ft of the small bowel. If this is indeed true, then many patients with SBS should be able to achieve a high degree of nutrient absorption.

The villi of the intestine—finger-like projections that reside throughout the GI tract—aid in absorption by increasing the surface area of the intestine. They also contain specialized cells that transport different types of nutrients into the blood. It has been estimated that the villi add 2700 sq ft to the surface area of the bowel—unlike human skin, which has a square footage of only 18 sq ft. While noting that dermatologists are typically responsible for the 18 sq ft of skin, Dr Wilmore posed an interesting question: "Who takes care of 2700 sq ft of intestinal mucosa?"

In self-response, he noted that nutrition support professionals uphold this responsibility by prescribing foods that keep the mucosa healthy. According to Dr Wilmore, the best diet for the health of the GI tract includes organic whole foods; at the bottom of the list are elemental diets. He also emphasized that because *any* food in the GI tract is better than no food at all and PN alone does not allow for mucosal adaption, enteral feeding is important because it stimulates mucosal growth, provides antigens to support immunity, enhances the barrier defense system of the gut, and nourishes the gut microbiome.

The second half of the keynote address focused on other strategies to improve patient outcomes among those with SBS. The first is communication, and Dr Wilmore described his experiences in coaching patients who had undergone SBS regarding how and what to eat. He urged clinicians to take advantage of electronic tools and apps, such as video chat, which allows patients to visually share the contents of their refrigerators and pantries. This same technology allows patients to be coached at the supermarket and restaurants as well. Wearable devices allow patients to track their calorie intake, steps taken, body composition, and hydration status. He also called for insurance companies to consider reimbursing patients for such devices, as well as reimbursing clinicians for time spent out of the office coaching patients and monitoring the data generated from these devices.

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Dr Wilmore then went on to discuss the importance of the gut microbiome. There are 23 000 genes in the human body but more than 1 million genes in the bacteria that reside within the human body—most of them within the colon. These bacteria maintain a symbiotic relationship, with the "good" bacteria keeping the pathogens under control. According to Dr Wilmore, diet is the most important element in maintaining the best bacterial balance for the gut biome; antibiotics are the worst.

He described an experiment whereby germ-free newborn mice received a fecal transplant from genetically related adult mice that were either obese or of normal weight [Turnbaugh PJ et al. *Cell Host Microbe.* 2008]. All the mice were then pair fed: half the young mice became obese and half did not. After examining the genes within the bacteria of the 2 groups of young mice, the researchers determined that some genes made enzymes that allowed previously nonabsorbed nutrients, such as complex carbohydrates and fiber nutrients, to be absorbed and used as energy by these animals. Dr Wilmore urged his colleagues to think about whether providing these organisms to patients with SBS could enhance nutrient absorption and digestion.

While routine colon transplantation for patients with SBS is at least a few years away, Dr Wilmore hypothesized that transplantation might improve survival and provide patients with a healthier gut biome. He proposed several research programs that might support colon transplants, such as investigating ways to maintain the "good" bacteria while eliminating the pathogens, as well as in vivo studies of the ideal growing nutrient solution for the intestinal tract. Once that ideal solution is identified, it may be possible to grow pieces of intestine in vitro. With use of patients' stem cells, it may even be possible to culture the cells into intestinal tissue that can be transplanted back to the patients without the need for immunosuppression.

Dr Wilmore closed his lecture by highlighting the importance of pooling data from the small global heterogeneous patient population who undergoes small bowel resection. He urged A.S.P.E.N. members to take the lead in collaborating with other countries to contribute their patient data and share the best therapies, best timing, and best ways to move ahead—all with the goal of improving patient outcomes.

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