

# ADVANCES IN ENDOSCOPY

Current Developments in Diagnostic and Therapeutic Endoscopy

Section Editor: Klaus Mergener, MD, PhD, MBA

## Outlook on Gastrointestinal Endoscopic Device Innovation



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### G&H How did you start your journey as an innovator?

**BM** Being an innovator is fun and unpredictable. I have loved tinkering with devices since childhood. Formally, I was lucky to have trained in an innovative laboratory with Dr Christopher C. Thompson at Brigham and Women's Hospital in Boston. After completing my gastroenterology fellowship and entering private practice, during one of

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my first nights on call, I encountered a particularly frustrating food impaction case. This sparked an idea for a novel foreign-body retrieval device. At that time, I was using two different devices that operate on different principles, each with advantages and disadvantages. I used discarded parts to make a decent prototype that combined

elements of each current device. From that point on, it has been an interesting journey.

### G&H Where should physicians turn if they have ideas for new products?

**BM** Initially to flesh out an idea, researching it on the Internet helps. Approximately 90% of ideas that I think are new have already been done, so a quick Internet search is critical. Writing and/or sketching the idea down when feasible is important. Personally, I learn a lot by creating crude self-built prototypes based on ideas. The next step would be to consider whether the device is actually useful and possible. In addition, the physician innovator should try to develop an understanding of the market landscape, identify the problem the device solves, estimate the cost of the device, and explore some alternative approaches. Having a small circle of advisors who can be trusted to bounce ideas off is also very helpful; however, any sharing of ideas should be done carefully. For an innovator starting out, it can be challenging to know who to talk to and who not to talk to. At this point, if the physician feels an idea is worth pursuing and decides to proceed, then the next step should be to consider filing a provisional patent or consulting with a patent attorney.

Diving into an unfamiliar territory, especially for a busy gastroenterologist, can be challenging. I am lucky to be in a practice with a structure that allows space for individuals to develop projects and has partners who are open to new ideas. Fleshing out a novel concept takes a lot of trial and error. New ideas, especially at the early stage,

can be vulnerable to skepticism, so having supportive colleagues is important. It is likewise important to have someone who can gently point out flaws.

### **G&H** Who can help physicians develop new products?

**BM** This may depend on the individual work environment and the project. I found that teaming up with a partner (in my case, a fellow gastroenterologist Dr Drew Schembre) to be an invaluable part of the process. We meet to brainstorm, prototype, and vet ideas. I have also benefited greatly by keeping in touch with my former fellowship mentors as well as a few individuals from industry. In my experience, connecting with other people who build (eg, engineers) can bring a different perspective that may be beneficial.

### **G&H** How can physicians become better innovators?

**BM** Asking questions and pursuing a project (large or small) are probably the best ways. Physicians can record their questions in an idea journal. What can be improved? Why is something done this way? Are others doing it differently? What can be eliminated? What if cost were no object? Recording ideas in some way is key and could be as easy as taking a photo with a smartphone or jotting a sketch. More formally, setting aside time to brainstorm ideas is also important. This process is enhanced by arranging to meet with others to discuss ideas. Again, seeking different perspectives outside of one's field by reading or by expanding one's circle of acquaintances can be beneficial. In addition, being curious about craft production and technology in general is helpful. Physicians can also become involved in innovation interest groups.

### **G&H** How does one transform an idea into reality?

**BM** Creating a usable prototype takes persistence and funding. Before moving past the idea phase, it is important to be realistic about the viability and need for an idea. Knowing what not to pursue is important. If an idea seems novel, possible, and useful, I like to start prototyping. Over time, Dr Schembre and I have improved our ability to prototype, test, and iterate devices. We learned a great deal from a colon simulator and pig stomachs. Translating a concept into a physical form (however crude) is immensely valuable. This process can validate a concept, bring problems to the surface, or occasionally point the project in a different direction.

### **G&H** Where does one find the money to do early-stage device development work (outside of the major established corporate players)?

**BM** Grants, self-funding, and local angel networks are all options. Dr Schembre and I applied for and received a Washington State Life Science Discovery Fund award, which allowed us to hire Product Creation Studios in Seattle to help us develop a sophisticated prototype hemostatic clip. In addition, we were able to obtain a market analysis and a freedom-to-operate search, file a

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patent, and engage an animal laboratory. Grant funding is helpful, but it may not cover all the costs associated with device development. Innovators can also start their own company and obtain investors, which although time-consuming can be potentially rewarding. Another option is to license the product to an existing device company.

### **G&H** What is limiting innovation in gastrointestinal endoscopy?

**BM** A few factors limiting innovation are the complexity, high cost, and small possibility of getting a device to market. I was once told that in general roughly 1 in 300 ideas reach commercialization. The complexity of medical devices is inherently limiting; even a relatively simple medical device is quite complex. Gastroenterologists are typically clinically quite busy and are rarely incentivized to propose new device innovations. I would say that the majority of new devices are developed internally by well-established medical device companies.

### **G&H** What role do professional societies have to play in supporting physician innovators?

**BM** Professional societies can play a major role. One version of innovation is when academic institutions have the

time and space to innovate; the consistency and commitment over long periods can advance entire new areas in endoscopy. An example of this is the work of Dr Thompson's laboratory and the evolution of bariatric endoscopy. On an individual level, the average American Society for Gastrointestinal Endoscopy (ASGE) member is not likely to run a laboratory, have fellows, or have National Institutes of Health grants. However, there is room for individuals to pursue innovation. In endoscopy, innovation may include not only novel devices but also innovative ways in which gastrointestinal care is delivered, health information is processed, and patients and providers are educated.

### G&H What type of innovation is currently having a large impact on gastroenterology practice?

**BM** Over the past several years, there have been several innovations, which taken together, have had a great impact. In no particular order, these include improvements in hepatitis C and inflammatory bowel disease treatments, expansion of the role of physician extenders, minimally invasive procedures such as peroral endoscopic myotomy, widespread adoption of electronic health records, propofol sedation, better bowel preparations, hemostasis sprays, over-the-scope clips, lumen-apposing stents, virtual visits, and practice consolidation. Another innovation that is having an impact on gastroenterologists is the use of social media as a medical education tool. An example of this concept is the X (formerly Twitter) channel created by Dr Andy Tau. Dr Tau, whose X handle is DrBloodandGuts, regularly posts short videos demonstrating approaches to inpatient clinical situations in which he often uses modifications to existing tools. For instance, in one video, he demonstrates a method to apply hemostatic powders more

reliably. He presents the modification in a way that is easily applicable for practicing gastroenterologists. By combining technique modifications and social media, Dr Tau has produced a great deal of innovation using only readily available resources.

### G&H How can innovation be encouraged?

**BM** Grants, prizes, and innovation awards all help. I would like to see more opportunities for physicians to train in a laboratory that celebrates innovation and practice in a group that is open to novel ideas. One way of encouraging innovation is not to discourage it. I believe that both large and small innovations should continue to have platforms for discussion. Toward that end, last year, the ASGE presented the Innovation Awards to support invention concepts that could advance the practice of gastroenterology and patient care. Although pursuing an innovation can be a time-consuming challenge, the pursuit itself often can be surprisingly rewarding.

### Disclosures

*Dr Merrifield has no relevant conflicts of interest to disclose.*

### Suggested Reading

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