Exploring the final frontier

As you’re reading this, Kjell Lindgren is preparing for his first mission in space. The physician-astronaut is a member of the Soyuz 43 crew, a three-person team that will be joining astronauts already on the International Space Station at the end of this month. He is the only physician on the team.

“This is a dream come true,” says Lindgren, who admits he wanted to be an astronaut before he ever thought about becoming a physician. But he saw medicine as a more practical calling. So after earning his undergraduate degree at the Air Force Academy in Colorado Springs and getting a master’s degree in cardiovascular physiology at Colorado State University, where he focused on the effects of microgravity on the body, he went to medical school at the University of Colorado.

Lindgren came to Minnesota to do a residency in emergency medicine at Hennepin County Medical Center (HCMC)—he was in the class of 2005. A mentor at the University of Colorado, Michael Yaron, had trained at Hennepin and recommended it. “I went out there and fell in love with the city and people in the program. It was No. 1 on my list when I applied to residencies,” he says. He then did a post-doc fellowship and earned a master’s degree (both in health informatics) at the University of Minnesota before doing another residency in aerospace medicine at the University of Texas Medical Branch in Galveston.

Last fall, Lindgren returned to Minnesota to speak to EMS medical directors as well as students and staff from HCMC. We caught up with him while his boots were still on the ground to learn how his experience in emergency medicine has helped shape his work as an astronaut.

Why did you decide to pursue emergency medicine as a specialty?

As an undergraduate, I got an EMT certification just to see if I could work in that environment, if I could work around people who were ill or who had suffered trauma. I rode on ambulances and volunteered in the ER in Colorado Springs and other places. I found I really enjoyed serving the community.

So even at the beginning of medical school, I wanted to do emergency medicine. I tried to keep an open mind when going through rotations, but I always came back to emergency medicine.

How does your experience in emergency medicine help you in your work as an astronaut?

There are a lot of things about medicine in general and emergency medicine specifically that translate well into the work I’m
doing now. First you have to work well with people, work well on a team. It’s not a one-person show. In space, you have to rely on others. And there’s a lot of knowledge you have to soak up and a lot of procedural work. In space, you’re in what we call an “operational environment.” Decisions have to be made quickly, sometimes with incomplete information, and the consequences of your actions can carry a lot of weight. That applies in the ER, too.

What will you be working on?
There’s a study out of Colorado State University looking at telomeres and the effect being in space has on cell aging. We’ll be looking at viral latency within the human body, how our immune systems change in space. We’re also looking at bacterial virulence in space—what happens to the bacteria that are part of the normal human biome and how and why they change in space.

By the time I arrive, several of my colleagues will be two months into a year-long mission on the space station. They will provide the scientific community with information on the effects on living in weightlessness for an entire year. That will be important as we think about doing long-duration space flights to Mars or beyond.

What will you do during your downtime?
We’ll spend two hours a day exercising to maintain bone, muscle and cardiovascular health. We have a little free time in the evening when we can take photos and exchange email with friends and family.

How important is exercise in that environment?
It’s something we use as a countermeasure to the changes that occur in the body. If we did nothing, our muscles would atrophy, our cardiovascular system would become deconditioned, our bones would weaken. We have a whole suite of exercises we do, so when we return to Earth we’ll have close to the same strength and bone health that we had before we left.

We have exercise machines at the space station—a cycle ergometer, essentially an exercise bike; we have a treadmill; and we have a resistance exercise device. It’s not a weight machine, since weight doesn’t exist. But it’s essentially a universal gym. Resistance is provided by evacuated cylinders. With all those things taken together, studies indicate that astronauts are coming back in better shape now than ever.

What are you most looking forward to?
I’m excited to see what life is like in space. The human body, the human psyche are so adaptable. The fact that we can live off the planet is remarkable. I’m excited to experience that and am looking forward to being able to look back on the Earth. One of my friends is up there now. Every time he sends a picture, he says it doesn’t come close to reality. To take that in first-hand will be amazing. – KIM KISER