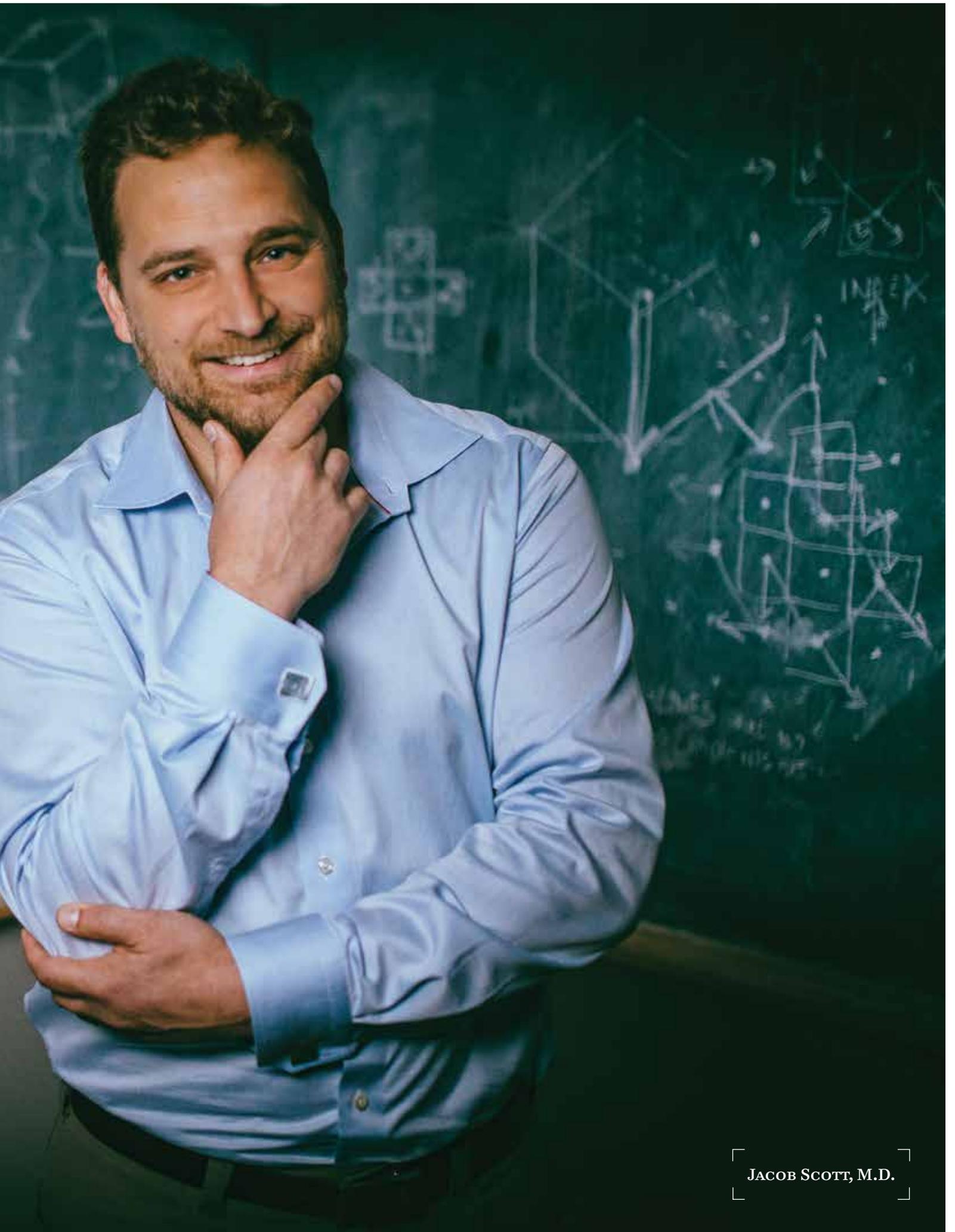


Where Math, Science & Cancer Intersect

Physician-Scientist Uses
Mathematical Equations To
Unlock Cancer's Secrets

By Janan Talafer

Photography: Ray Reyes



JACOB SCOTT, M.D.

Jacob Scott, M.D., or Jake as he prefers to be known, tosses a Slinky back and forth, from one hand to the other. He has a blue one and a green one, and one of them is always in constant motion, like his mind, which never stops asking questions in the search for a cure for cancer.



The Slinkys help him still his thoughts, he says. It's more than a nervous habit; it's almost a meditative trick to help focus a creative mind that has boundless energy and curiosity.

In fact, he thinks and speaks so quickly it's almost hard to keep up, as if he's on a race against time, which in a way he is. He's only 39, but he's driven to find a breakthrough in cancer treatment.

Like many of the physician-scientists at Moffitt Cancer Center, Dr. Scott is looking for answers to what he calls \$10 million questions like: What is the exact moment when cancer begins to metastasize? Or how do cancers acquire resistance to drugs that initially seem to kill them?

“Questions like this keep me up at night, along with concern about my patients, my doctoral thesis at Oxford and how well I can yell, ‘I’m a codfish,’” Dr. Scott says.

That's quite a combination. The reference to codfish comes from the Disney movie *Peter Pan*, where Captain Hook yells, ‘I’m a codfish.’”

Dr. Scott calls me over to his computer and in between showing me images of complicated color graphs and charts of tumor growth, he displays a video of his adorable 3-year-old son, Rhys, charging forward with a toy light saber, yelling, “I’m a codfish.”

That he's a family man, as well as a dedicated doctor, is quite evident.

Dr. Scott and his wife, Sarah, have two children, Rhys, and Maren, 7. One of his patients likes to tell the story of how she was feeling very depressed and Dr. Scott, fresh from a weekend of watching *The Little Mermaid* with his daughter, broke into the theme song of the movie to cheer her up.

“I’m eager to get home and be with my family, but after the kids go to bed, then I am eager to get back to work, which is so meaningful to me,” he says.

SEEKING ANSWERS USING A BOARD AND CHALK

At Moffitt, Dr. Scott is a radiation oncologist and section chief of sarcoma. Sarcomas are relatively rare cancers that grow in the bones and connective tissues — the muscles, cartilage, nerves, fat and even blood vessels.

He also is a team member of Moffitt's Integrative Mathematical Oncology Department. IMO is made up of an innovative research group of biologists, physicists, mathematicians,

computer scientists and clinicians who are combining science, math and “first principles” to better understand, predict and treat cancer.

That means rather than searching for answers with a microscope in the lab, Dr. Scott uses a computer and a chalkboard. His chalkboard is covered in mind-boggling mathematical equations.

“I like to use the lens of mathematics to think about things and to see what we can’t see,” says Dr. Scott, who has a passion for scientific inquiry, algebra, physics and abstract theoretical math.

His research focuses on developing mathematical models to gain insight into how cancer evolves to resist treatment. Better understanding of the concept of “cancer evolution” might be the key that unlocks new ways of treating patients, he says.

His clinical interests include how to tailor radiation oncology treatment so it is personalized based on the patient’s genetic profile, similar to the new standard of treatment for targeted biological agents. The goal is to deliver the right amount of radiation to the right patient to reduce side effects and improve survival.

When Dr. Scott looks out the window of his office, he sees posted on a nearby building the cancer center’s mission statement — “To contribute to the prevention and cure of cancer.”

“When I am frustrated with my work on the research side, I can turn around and look out the window and be reminded of why I am here,” he says.

DRIVEN TO FIND THE BETTER ANSWER

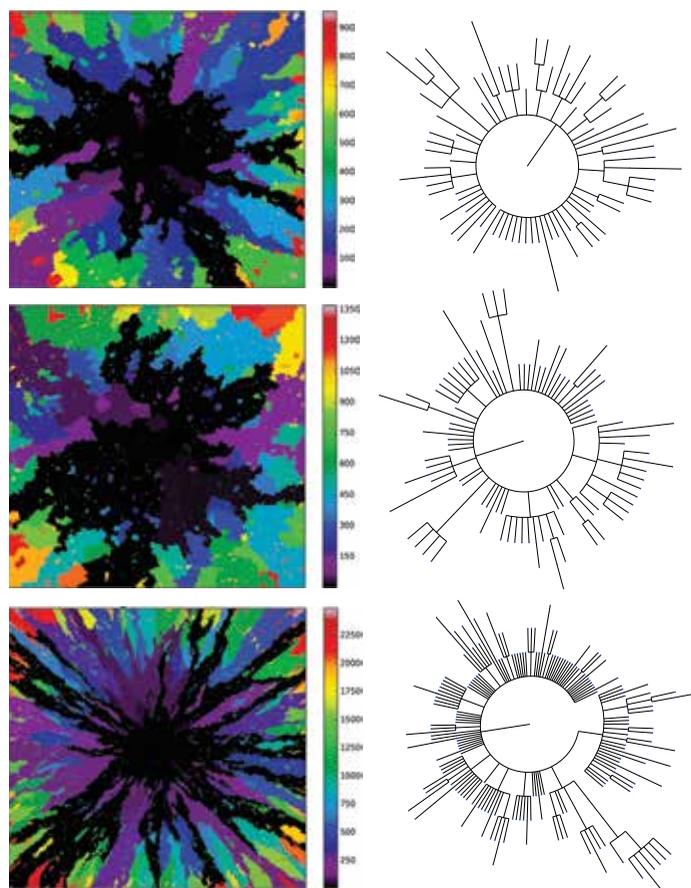
But on the other hand, he says, it can be a hard balance to be treating patients with the best evidence-based medicine currently available and then to come back to the research side and question everything.

“I like to use the lens of mathematics to think about things and to see what we can’t see.”

“I’m driven to always looking under the hood for what might be a better answer,” says Dr. Scott, who looks like he could be equally at home in a classroom, talking to patients, or running, rock climbing, biking or playing rugby — all of which he does.

He has climbed New Hampshire’s White Mountains, wrestled in college and coached wrestling at Stanton College Preparatory School, in Jacksonville, Florida, where he taught physics for a year before he went to medical school.

He has also played rugby with the Tampa Bay Krewe and at St. John’s College at Oxford in the United Kingdom, where this year he receives his Ph.D. in mathematical biology. His son, Rhys, is named after the Welsh rugby player Adam Rhys Jones.



Dr. Scott uses mathematical models to understand how cancers acquire resistance to targeted biological agents and to tailor radiation therapy based on patient-specific genomic and anatomic factors.

Dr. Scott didn’t set out to be a doctor. His father was a U.S. Army Ranger in Vietnam. His grandfather was on a battleship in World War II. In high school in a suburb of Cleveland, Ohio, he got hooked on physics.

After graduation, he got an appointment to the U.S. Naval Academy, where he studied astrophysics. The next step was the nuclear submarine base in Kings Bay, Georgia, where he served as junior officer in the U.S. Navy. But once his military duty was complete, he knew he didn’t want to continue a career in the service.

At the suggestion of a physician he met while rock climbing at a gym, he applied for medical school. He was already 30; nearly everyone else was in their early 20s. He was also married. But that didn’t deter him. Medical school changed the path of his life.

At Case Western Reserve University School of Medicine in Ohio and later through additional training at the University of South Florida and Moffitt Cancer Center, he finally found his path — taking care of patients with cancer, first as a radiation oncologist and then more recently as a mathematician researching cancer to better understand, predict and treat the disease.

“Cancer patients are an amazing breed. They’re like combat vets,” Dr. Scott says. “Both are choosing to look life in the eye despite everything. You have to honor both of them on the journey.” 🎧