Dr. Amir Hadayer regularly slips a needle into tissue thinner than a hair, in the confines of an eyeball.

Hadayer, 40, is a 2015-2016 APF Comprehensive Retinal Fellow in the Ophthalmology Department at The University of Louisville in Kentucky.

“Vision is the most important of the senses, the way it affects quality of life is immeasurable,” he says.

“The retina is the sensory organ that receives light in the back of the eye. If the eye is the camera, the retina is the film.

“Retinal specialists deal with conditions including: infection, trauma, inflammation and degenerative and acquired conditions such as from diabetes and age-related macular degeneration. Macular degeneration and diabetic retinopathy make up a major part of our job.”

Macular degeneration is deterioration of the macula, the small central area of the retina that controls visual acuity. Diabetic retinopathy is when damage occurs to the retina due to diabetes.

After the Tel Aviv native finished high school he competed to join the IDF’s prestigious Atuda (Academic Reserve) program that allowed him to complete medical school and internship before military service. Hadayer attended medical school at Technion and interned at Tel Aviv Sourasky Medical Center.

He was a primary care physician in the military.

Hadayer then completed ophthalmology residencies at Kaplan Medical Center in Rehovot and Rambam Health Care Campus in Haifa, followed by an informal retinal and cataract surgery fellowship at Kaplan.

He is now a senior ophthalmologist in the retinal service of the department of ophthalmology at Kaplan Medical Center, a teaching hospital affiliated with Hadassah Medical Center and Hebrew University Hadassah Medical School. He will return there after his Fellowship.

The Hadayer family, including wife Noa, 35, a physician doing a post-doctoral fellowship in dermatology, came to the U.S. from Jerusalem. Their sons are Daniel, 7, and Eyal, 5.

Dad wants people to know what a wonderful reception he and his family have received from the Louisville area Jewish community.

Hadayer already was “inclined toward medicine” in high school. “It gives you the opportunity and privilege to be exposed to an enormous amount of knowledge that is ever-changing, that can touch the lives of people at their most difficult times. Medicine really gives you the chance to make a difference. Also, the technology of today’s medical world has always enthralled me.”

He chose ophthalmology in medical school. “I was excited by the impact of vision on human life.

“I was also fascinated by the physiology of the eye, the vision mechanism and the complexity and ingenuity of the way the eye is constructed and the way vision is obtained.

“And I was always interested in physics to the same extent I was interested in medicine. Ophthalmology is heavily involved with physics, engineering and instrumentation such as lasers. That was very appealing to me.

“In medical school I discovered that ophthalmology deals primarily with the ‘quality of life’ rather than ‘life and death.’ I felt that I would prefer to be involved with that focus of medicine.”

During his internship he chose extra rotations in ophthalmology and research opportunities in that field. He also was part of an exchange program that allowed him a month at the University of Minnesota Medical School in Minneapolis. There he was involved in very exciting ophthalmology work, he said.

Very early in his residency Hadayer was "'captivated by the retina.' And I owe this first to my teachers who were superb professionals and fine people.

"Also, I think that vitreoretinal surgery probably requires the most dexterity of all the eye sub-specialties. (Vitreous is the transparent gel that fills the back part of the eye.) And there is the need to understand the physiology and physics behind the skill and expertise. I find it fascinating, challenging and rewarding.

"We are required to work with microscopes, special lenses, instruments and machines, which I love. And we must, in some instances, deal with membranes that are thinner than a human hair.

"And actually, the retina is an extension of the brain. A vitreoretinal surgeon is required to work on neuronal tissue with very delicate instruments."

What's the fellowship like?

"I'm busy all the time, from early in the morning until late at night. When I'm not in the clinic on weekends I'm busy studying or with research."

Hadayer's fellowship involves clinical, research and teaching time. He teaches medical students and residents, enjoying it very much. "Teaching helps keep you on your toes, up-to-date," he says. "I learn as much from my students as they learn from me."

He also teaches in Israel and will continue to do so upon his return.

During clinical time Hadayer does exams, out-patient treatment and in-patient surgery.

Retina surgery typically lasts about 30 minutes, but can take as long as four hours.

Here's an example of a critical pediatric surgery: "Preterm babies are at high risk of retinopathy of prematurity (ROP). In such conditions, without proper treatment, these poor babies might become permanently blind. We treat them with intravitreal injections, laser- and cryo-therapy (freezing) or actual surgery depending on the specific condition."

ROP is a disease that occurs in premature babies. It causes abnormal blood vessels to grow in the retina. This growth can cause the retina to detach from the back of the eye, leading to blindness. It primarily affects severely underweight preterms.

He also has dedicated research time, but "it's not enough."

"I'm exploring a new approach that we hope will be able to reverse ROP."

"Another problem being investigated in our department is reversing incurable blindness in hereditary diseases such as retinitis pigmentosa (RP). We are experimenting with sub-retinal injections of genetically engineered viruses and other medications with promising primary results."

RP is a group of rare, genetic disorders involving a breakdown and loss of cells in the retina.

"And I'm busy researching medical devices that will make eye examinations easier and less stressful for both patients and physicians." He is also doing cataract surgery research.

Hadayer has published three articles so far from his U.S. research. He's hoping for more. He's presented research abroad many times.

Was it necessary to leave Israel for this kind of training and research opportunity?

Yes. "It doesn't currently exist at this level in Israel with such resources. I didn't want to leave, but I had to."

Why Louisville? "It is a state-of-the-art clinical and research facility.

"Here you are exposed to a far greater variety and number of patients and conditions. This is a facility that allows me to continue very sophisticated cutting-edge research along with hands-on clinical training.

"The facilities and the personnel here are extraordinary. People come to Louisville from all over the world for treatment.

"I was welcomed very warmly by the faculty of ophthalmology chaired by Dr. Henry J. Kaplan, a world- renowned retina and uveitis specialist. (Uveitis is a form of eye inflammation that affects the middle layer of tissue in the eye wall, the uvea.) I am very lucky to have been accepted to this excellent program, working with such wonderful colleagues with exceptional expertise.

"When I return to Israel I intend to continue as a clinician/scientist involved in seeing patients, doing surgery, research and teaching.

What does he hope to take back to Israel after his stay in Louisville?

"I hope to share everything I have learned here with my colleagues in Israel to better care for our patients, things such as: advanced minimally invasive surgery, clinical approaches to various diseases, research techniques and overall patient care."

Hadayer says that there is a great demand for his services back in Israel, with an aging population and the ever-present war injuries. He will also take a special role in trauma work when he returns to Kaplan.