

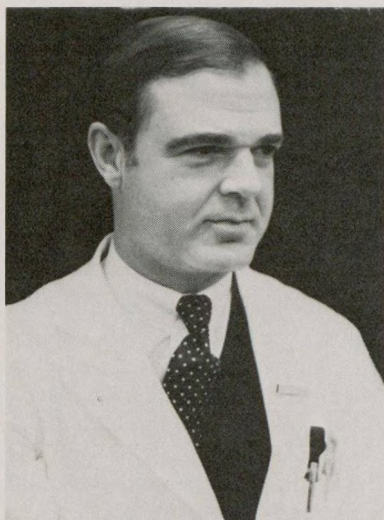
■ In the four years since he conducted the first surgical procedure ever performed on a human eye with an argon laser, Francis A. L'Esperance, Jr., M.D., has treated more than 3000 patients with the powerful blue-green beam of light. The young researcher-clinician, who is an associate in ophthalmology at Columbia's College of Physicians and Surgeons and the director of the John A. Hartford Laser Laboratory at the Harkness Eye Institute, refers to his innovative technique as "microplumbing." With the ingenious delivery system that he designed for the monochromatic, highly directional beam, he spot welds torn retinas and dams up neo-vascularized areas, creates new blood channels and obliterates microaneurysms.

This year Dr. L'Esperance received an additional grant of \$186,000 from the John A. Hartford Foundation for a study of the hemodynamics of retinopathies and their correction by argon laser photocoagulation. Initially the three-year investigation will be directed to diagnosing and treating early signs of diabetic retinopathy and macular degeneration that cause almost a fourth of all the cases of blindness in the United States. The research project is expected to illuminate the hemobarometric characteristics of many other pathologic conditions and to provide a systematic clinical approach that can be widely used in laser photocoagulation.

To determine the blood flow patterns and pressure in various retinal disorders, Dr. L'Esperance uses a new technique for measuring macular pressure utilizing a Nikon fundus camera and specialized fluorescein angiography. As the injected yellow fluorescein circulates through the retina, color pictures recording the vascular pressures are taken every 0.6 of a second to discover any abnormalities that can be corrected with laser photocoagulation.

In addition to his work at the Eye Institute, Dr. L'Esperance is a consultant to the Bronx Veterans Hospital and a member of the courtesy staffs at St. Luke's and Lenox Hill Hospitals. He serves on the

board of directors of the National Society for the Prevention of Blindness, on the board of the American Medical Association's ophthalmology section and is an associate editor of the *AMA Archives of Ophthalmology*. He is also a fellow of



the American College of Surgeons, the New York Academy of Medicine, the American Academy of Ophthalmology and Otolaryngology.

Origin. Francis A. L'Esperance, Jr., whose French ancestors came from Grenoble to fight with Lafayette in the American Revolution, was born May 9, 1932 at Doctors' Hospital in New York. His mother was the first nurse at the hospital and his father, a Tufts graduate who now practices general surgery in South Hadley, Mass., was the hospital's first surgical resident.

When the family settled in Northampton, Mass., Francis suffered an accident in the fourth grade at public school that may have influenced his future career. He was hit in the right eye by an icy snow ball one winter's day and for a time was thought to have a detached retina, but after 11 visits to the late Dr. Conrad Behrens in New York his injury healed completely.

As a youth Francis played the trumpet with several New England symphony orchestras and though he was encouraged to make music his career it became his avocation. At Deerfield Academy he captained the band, played junior varsity foot-

ball and was a member of the track team as well as the swimming team that set a national, unbroken record for the 160-yard relay.

At Dartmouth College he swam on the varsity team, skied and chaired a group that persuaded all the campus fraternities to abolish discrimination. In spite of his many activities he was one of 24 juniors from a class of 285 premedical students admitted to Dartmouth's two-year medical course. As a freshman in medical school he was also president of the undergraduate senior class but he made Phi Beta Kappa and was magnum cum laude when he received his A.B. in 1953.

When he transferred to Harvard for the last two years of medical school he was inspired by the teaching of the great surgeons Drs. Edward Churchill and Robert Gross. After he was awarded his M.D. in 1956 Dr. L'Esperance was planning to be a pediatric surgeon but during his surgical internship at New York's Presbyterian Hospital he decided that ophthalmic surgery offered the greatest challenge. In 1957 he returned to Boston for a three-year-residency at the Massachusetts Eye and Ear Infirmary under Dr. Edwin B. Dunphy.

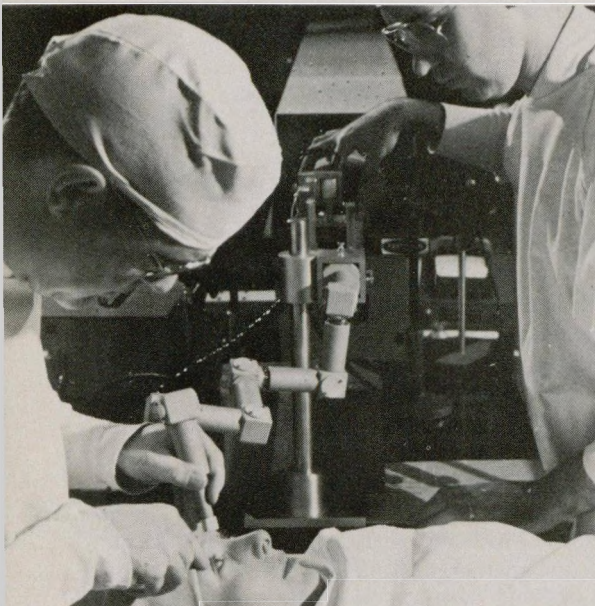
At the completion of his residency he came back to the Columbia-Presbyterian Medical Center to work with Dr. John Hughes Dunnington at the Eye Institute where Dr. L'Esperance had the opportunity to handle most of the retinal problems. Before he began to pioneer in argon laser photocoagulation he published studies on the use of reconstituted collagen tape and implants in retinal detachment surgery. He also devised an ingenious spade-like needle for threading an encircling element around the eye in the surgical management of detached retinas. One of his first papers described a new right angle erysiphake for cataract extraction that eliminated the torsion and leverage of the suction cup on the lens.*

First Light. Soon after the ruby laser was developed by Theodore

* This method of removing the lens by suction was introduced by Spanish ophthalmologist Ignacio Barraquer.

H. Maiman in 1960, ophthalmic investigators recognized its tremendous potential in photocoagulation. The initial trials showed that it was effective in the treatment of many ocular diseases but Dr. L'Esperance found that it was ineffective for most vascular disorders of the eye.

In 1965 he reported that experiments with chinchilla rabbits and rhesus monkeys as well as clinical



Dr. L'Esperance demonstrating the articulated arm for the argon laser.

studies had shown that neovascularized areas, aberrant vessels and angiomas were quite refractory to ruby laser radiation and that only a small percentage of microaneurysms could be obliterated by the red beam. Since hemoglobin and blood vessels did not appreciably absorb the ruby-colored light, he had decided that a blue or green beam was needed to coagulate vascular structures. When he learned that the Bell Telephone Laboratories had developed an argon gas laser he went to New Jersey to investigate the blue-green beam. After conferring with the Bell scientists he obtained a grant from the Hartford Foundation* and induced the Raytheon Corporation to undertake the difficult job of constructing an argon laser with an output of five to ten watts.

Within a few months Dr. L'Esperance was designing a delivery sys-

tem that would make argon laser photocoagulation a safe and highly effective method. The intricate, precise system built in collaboration with the American Optical Company, retained some elements of the ruby laser photocoagulator and added new features. A microscopic system fabricated at the Bell Laboratories with the cooperation of physicist Edward F. Labuda, permits the surgeon to view the target area binocularly, stereoscopically and with varying powers of magnification.

An articulated arm for surface photocoagulation, designed by the Bell Telephone Laboratories for Dr. L'Esperance, consists of a series of hollow tubes and blocks equipped with prisms that guide the beam from the laser source through the jointed arm to a pen-sized handle. The easily moved handle enables the surgeon to focus the laser beam in any direction and the highly maneuverable system, dubbed the "light knife," can be used with both pulsed and continuous wave lasers of any visible wavelength.

Trials. When Dr. L'Esperance's initial argon laser was being delivered to his laboratory the rigging snapped as the apparatus was being hoisted up the side of the Eye Institute. A cracked tube was replaced in time but there were other problems: it was necessary to devise a water purification system that could deliver four to five gallons a minute to cool the operating laser. Once the early difficulties were overcome, extensive animal experiments demonstrated that the argon laser radiation (4579 to 5145 angstroms) is absorbed by hemoglobin 4.5 times more effectively than the xenon arc and about eight times more effectively than the ruby laser. The intense monochromatic blue-green beam appeared to be absorbed selectively at the nuclear layers, pigment epithelium and the outer segments of rods and cones. The radiation produced no detectable effects, other than thermal, on ocular tissues, plasma proteins or other blood constituents.

On February 14, 1968 Dr. L'Esperance performed the first operation with the argon laser by obliterating a large membrane that had formed behind the iris of an eight-

year-old girl. Photocoagulation with the argon beam, now a simple procedure, requires no preoperative sedation, anesthesia or akinesia, causes no pain or discomfort. The patient, whose pupil is first dilated with Neosynephrine and Cyclogyl, is allowed frequent rests during treatment and goes home after the 20 to 30 minute session without wearing an eye patch. To date, Dr. L'Esperance has treated approximately 1800 cases of diabetic retinopathy, and 900 of macular diseases with the argon beam which can be focused on retinal areas as small as 30 microns in diameter.

A krypton ion laser that Dr. L'Esperance built with the help of the Bell Laboratories can produce wavelengths at any of the colors in the visible spectrum. For this reason it showed promise of being a "dial-a-color" laser that could emit the proper wavelength of radiation for coagulating each of the various types of retinal abnormalities. Since it requires a massive power supply, it remains a research tool but other new lasers may prove to be effective dial-a-color photocoagulators.

Surgeon's Schedule. At his midtown Manhattan office, Dr. L'Esperance sees patients from eight A.M. until two. He spends every afternoon at the Eye Institute doing surgery, photocoagulation, clinical research and teaching and it is often nine or ten at night when he finishes working in his research laboratory on a new technique or device. Weekends are frequently devoted to solving a research problem or to the preparation of slides for lectures. Since the first of the year he has participated in professional meetings in Atlanta, Palo Alto, Los Angeles, San Juan, Houston and next month he will report on the hemobarometric study of the retina to the American Ophthalmologic Society in Hot Springs, Va.

Dr. L'Esperance and his wife, Ellen, who live in Tenafly, N.J., have three children: Franny, his father's namesake and fellow trumpet player is 15; Linda is almost 13 and Laura will soon be eight. On his rare free afternoons their father enjoys taking them to football games and he keeps trim by playing tennis twice a week and swimming at Columbia's Bard Hall.

* The foundation has contributed almost \$500,000 to Dr. L'Esperance's research.