

## 20 YEARS OF LASIK

# RUSSIA AND LASIK

Siberian researchers deserve credit for early proto-LASIK procedure, says excimer laser pioneer

by Roibeard O'hEineachain in Dublin

Among the many different strands of research that together contributed to the creation of the LASIK procedure as we know it today is the little-known work of a Russian team of ophthalmologists who were the first to perform an excimer laser ablation on the stroma beneath a corneal flap.

At a meeting held at the Columbia University in New York in September 1990 by the Edward S Harkness Eye Institute and the Columbia University College of Physicians and Surgeons, two Russian ophthalmologists Alexander M Razhev MD and VP Chebotaev MD, from the Novosibirsk Institute in Siberia, reported their two-year follow-up after performing laser ablation beneath a hand-cut reflected corneal flap using a home-made excimer laser, Stephen Trokel MD, Columbia University, told *EuroTimes* in an interview.

"Jose Barraquer really deserves credit for the idea of corneal reshaping using industrial technology and many of the keratomileusis surgeons jumped on the idea of using the excimer laser instead of a cryolathe. However, the Russians were the first to cut a flap and operate on the stromal bed, and should be recognised," Dr Trokel said.

In their report, the Russian researchers first described their histological findings with two excimer lasers, one, an ArF laser with a 193 nm wavelength, and the other, a KrCl laser with a 223 nm wavelength. They then described their clinical results for performing PRK procedures in eyes with high myopia, which ranged from 14.0 D to 22.0 D.

They noted that although the surface treatment substantially reduced the patients' myopia, it also resulted in visually significant haze and up to 5 D of astigmatism. Concerned about the possible role of the destruction of Bowman's membrane in these complications, the Russian team modified their technique for the treatment of four subsequent patients with myopia ranging from -15.0 D to -16 D.

Using a 5.0mm trephine, they cut 100 microns into the central cornea and then performed lamellar keratectomy with a knife and folded the resulting flap away from the stroma. They then applied the laser ablation with a rotating mask technique. Following the ablation, they used a biologic adhesive to fix the flap back in place upon the stroma and provided patients with contact lenses.

The patients' initial postoperative refraction

ranged from -1.0 D to -3.0 D and uncorrected visual acuity was 20/60 or better in all eyes. At two years' follow-up, the patients had 1-2 D of regression, minimal astigmatism, and no visually significant haze. The researchers concluded that the low haze and astigmatism was due to the preservation of Bowman's membrane.

"They were right about the haze but the evidence of most research does not support a role for the flap in preventing astigmatism. Still, they were more right than wrong in their approach," Dr Trokel said.

The Russian team also performed the same "proto-LASIK procedure" in five hyperopes, whose preoperative refraction ranged from +15.0 D to +19.0 D. In these patients they applied the laser energy to the central 1.0mm to 1.5mm of the cornea. As in the myopes they observed a dramatic improvement in refraction, to +2.0 D to +4.0 D.

Dr Trokel noted that many were considering re-shaping the cornea from within. "As soon as commercial instruments were being developed there was discussion about a Barraquer style keratomileusis, a stromal bed keratomileusis and surface PRK. The latter was tried initially because it was easier and didn't require a microkeratome, which would have added a whole new layer of risk. Nonetheless, the international cadre of keratomileusis surgeons were talking flap from the onset, Hugo Nano in Buenos Aires, Burrato in Milan and others," he said.

Dr Trokel said that LASIK would not have been developed without the work of Jose Barraquer MD in Colombia. Not only did he invent the microkeratome, but he also set in motion the quest to discover the ideal tool for reshaping the cornea. The LASIK procedure, as first demonstrated by Ioannis Pallikaris MD, was the culmination of this research, he said. "It was Barraquer who really pointed out that the tools the surgeons were using were not up to the task of refractive surgery. He sought out the most precise tool available to him and used a jeweller's lathe. I found a better tool in the form of the excimer laser. However, Pallikaris really deserves credit for assembling the LASIK operation in its final form, the guarded microkeratome, the hinged flap and the bed ablation. And people keep making it better," he added.

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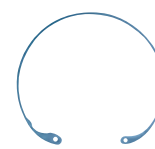
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