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**OPHTHALMOLOGY
 NEWS**

One small-step for LASIK-kind

by Maxine Lipner Senior EyeWorld Contributing Editor

Advanced LASIK gets the nod from NASA

Traditional LASIK has taken the public by storm, but not the National Aeronautics and Space Agency (NASA), who until recently had put the kibosh on any refractive surgery for anyone with space aspirations. All that changed in September 2007 when NASA announced that they were now amenable to LASIK for its astronaut applicants.

Although it had taken NASA some time to come around to the idea, refractive surgery is actually a natural for astronauts, according to Steven C. Schallhorn, M.D., chief medical director of Optical Express and in private practice in San Diego. The appeal for astronauts is much more than cosmetic. "Glasses and contact lenses are not conducive to the aerospace environment," Dr. Schallhorn said. "For instance, you cannot rely on gravity to simply put a drop on your eye, you have to essentially dock with the drop." Likewise, cleaning contacts with no gravity is much more laborious. "In addition, there have been contact lens-related problems in space," said Dr. Schallhorn, who for nearly 10 years was a consultant for NASA for nearly 10 years.

Early LASIK countdowns

Despite the appeal, NASA was



Glasses are not conducive to an aerospace environment. Cleaning contacts is very difficult in an aerospace environment

reluctant to go forward with refractive surgery before now. At the start, the two principal concerns shared by NASA and the military were the stability of the LASIK flap and the resulting quality-of-vision after the procedure.

The Navy launched a series of internal studies to address how the LASIK flap would fare under extreme conditions. "We conducted three studies on top of Pikes Peak," Dr. Schallhorn said. "Those studies concluded that there was no hypoxia or hypobaria effect on either PRK or LASIK."

Studies also considered other environmental issues concerning the LASIK flap. In a study that appeared in the August 1996 issue of the *Journal of Cataract and Refractive Surgery*, investigators looked specifically at high-velocity wind blast in an animal model. There doesn't appear to be an added risk of flap displacement in the aerospace environment," Dr. Schallhorn said. "That's not to say that the flap can't displace, but the risk is very low."

Although LASIK flap stability was one cornerstone, NASA continued to have concerns about quality of vision with LASIK. "Five years ago we did a retrospective analysis of our conventional results comparing PRK and LASIK, before wavefront-guided," Dr. Schallhorn said. "The conclusion was that PRK at that time had slight but significantly better quality of vision after surgery."

For aviation, this was a LASIK show stopper for both the Navy and NASA. "Because quality of vision in an aviator is so critical, LASIK just wasn't worth the risk. While PRK took longer to recover, the ultimate average outcome was an improved quality of vision," Dr. Schallhorn said.

While the Navy initiated a PRK-based program for aviators, NASA continued to hold back. "They were interested in the whole package," Dr. Schallhorn said. "They wanted to know if LASIK would be satisfactory also."

Into the final frontier

Advances in LASIK technology, however, spurred NASA to take another look. "We studied wavefront-guided LASIK and found that it was clearly superior to conventional procedures," Dr. Schallhorn said. "We then looked at the femtosecond laser and compared it to mechanical microkeratomers and found that the femtosecond flap was superior in a number of important areas." When the two new approaches were paired, investigators found that LASIK had made up for the early shortfall.

In the study, which was presented at the 2007 American Academy of Ophthalmology Symposium in New Orleans, investigators led by Dr. Schallhorn found that advanced LASIK, meaning the femtosecond flap combined with wavefront-guided treatment, fared well with night driving simulation. "Approximately 45% of eyes treated with conventional LASIK had a measurable loss in our night-driving simulator," Dr. Schallhorn said. "Just 3% of the femtosecond wavefront-guided eyes had that same measurable loss. In addition, there was an average increase in night-driving performance after advanced LASIK in contrast to a loss after the conventional procedure."

Armed with these results, Dr. Schallhorn approached leaders from the Navy aeromedical community, who had been waiting for the project results. "After the studies were complete and analyzed, my recommendation was that advanced LASIK was ready for the aviator," Dr. Schallhorn said.

After reviewing the data, not only did NASA ultimately agree that

advanced LASIK was ready for prime time, but a short time later so did the military. "The air force changed their policy to allow all forms of aviators to undergo LASIK," Dr. Schallhorn said.

He sees the approval of LASIK as having important implications. "Ten years ago, nearsighted individuals could not become pilots or astronauts," Dr. Schallhorn said. "What laser vision correction means is that these people can now have their aspirations come true."

It is also significant in a much broader sense. "NASA independently examined advanced LASIK and determined that it was good enough for the astronaut," Dr. Schallhorn said. "That should give comfort to ophthalmologists who are offering LASIK and patients contemplating undergoing the procedure."

Editors' note: *Dr. Schallhorn has financial interests with Advanced Medical Optics (Santa Ana, Calif.) and AcuFocus (Irvine, Calif.).*

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