



Steven Schallhorn

NASA approves all-laser LASIK for astronauts

Devon Schuyler

THE US space programme has always barred its astronauts from having refractive surgery. But last September, the National Aeronautics and Space Agency (NASA) began allowing astronaut applicants to undergo LASIK.

NASA based its decision on extensive testing of advanced technology LASIK by the US military. The US Air Force recently approved LASIK for its pilots.

"Many years ago when LASIK was becoming popular in the community we didn't understand the implications of LASIK relative to the environment of the cockpit," said Steven Schallhorn MD, a NASA consultant who was the director of refractive surgery for the US Navy before his military retirement last year.

Dr Schallhorn is also chief medical director for Optical Express in Glasgow, Scotland, and has a private practice in San Diego. He said that there were concerns about how LASIK would perform in space, such as how the flap would hold up in a low-oxygen, low-pressure environment.

"We wanted to make sure that minor trauma wouldn't dislodge the flap," said Smith Johnston MD, a NASA physician who oversees astronauts' medical standards.

NASA was also concerned about the possibility of visual problems, such as haloes and glare. Military research had determined that on average, quality of vision and contrast sensitivity tended to be lower with conventional (standard) LASIK than with PRK.

On the other hand, NASA and the military were drawn to LASIK's speedy recovery time, which is a major advantage for a pilot.

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Dr Schallhorn said that the military developed a renewed interest in LASIK after the introduction of two new technologies: the femtosecond laser for flap creation and wavefront-guided excimer lasers for optical correction.

Optical Correction of Astronauts

- 75% of flights have a CL wearer
- 53% of all EVAs have either a spectacle or CL wearer
- Microbial keratitis has occurred
 - Staph epi
- Presbyopia is an issue
 - 39% of spectacles are multi-focus



First Naval Aviator to undergo LASIK



What Happened Next...

- April 07: NASA MAB meeting
 - Recommends approval of LVC based on improved results of WFG and femtosecond LASIK
- May 07: USAF approves LASIK
 - All aviation categories (tx in AF centers)
 - Recommends WFG and femtosecond laser
- Sept 07: NASA approves LASIK for astronaut applicants
 - Preop +4 to -8D MSE, up to 3D cyl

"I was convinced that we needed to carefully study both of these key technologies," he said. But rather than relying on industry-sponsored research, the military conducted its own tests.

Dr Schallhorn presented the results of a study of 100 military personnel that underwent femtosecond WFG LASIK at the 2006 ESCRS meeting. In that trial, 95 per cent of eyes achieved uncorrected vision of 20/20 or better. He also showed that a WFG procedure resulted in improved quality of vision compared to conventional. In another study of 370 naval personnel, more patients achieved uncorrected visual acuity of at least 20/16 with the femtosecond laser (76 per cent) than with traditional microkeratomes (58 per cent). These results were presented at the 2006 AAO meeting.

The military also conducted tests to ensure that the flap would hold up under a variety of aviation-related conditions, including hypoxia and hypobaria. A windblast simulator was used to approximate ejection from a flight seat, Dr Schallhorn said.

Now that NASA has approved the use of LASIK for astronaut applicants – which includes pilots, mission specialists, and payload specialists – people who have had refractive surgery are able to apply to the programme. Applicants need to be at least a year postop, with best-corrected visual acuity of at least 20/20 and no visual symptoms related to the surgery.

Dr Schallhorn said that because more than half of astronauts wear glasses or contact lenses, the new ruling "could potentially apply to a lot of them." Dr Johnston said that glasses and contact lenses can easily get misplaced during missions, and contact lenses bear a risk of infections. Astronauts would be eligible for up to 8 D of myopia correction and 4 D of hyperopia correction.

The new ruling would also make it possible for people born with poor vision to become astronauts. Poor distant vision – less than 20/200 uncorrected vision, and less than 20/20 corrected vision – is the number one reason for disqualification from NASA.

"Now we'll be able to open it up to a larger pool of applicants," said Dr Johnston.

Dr Schallhorn said that this new ruling should make people feel more confident about getting LASIK surgery, even if they're not space-shuttle bound.

"If it's good enough for an astronaut, I think people can choose LASIK with a lot more confidence," he said.

He added that NASA is confident that LASIK will hold up in outer space.

"But there's only one way to test it under Zero-G, and that's to send someone up with LASIK," he said.

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Courtesy of Steven Schallhorn MD