

Astronauts at risk of squashed eyeballs

Space is not good for your eyes—unless you are nearsighted, in which case it might help a bit

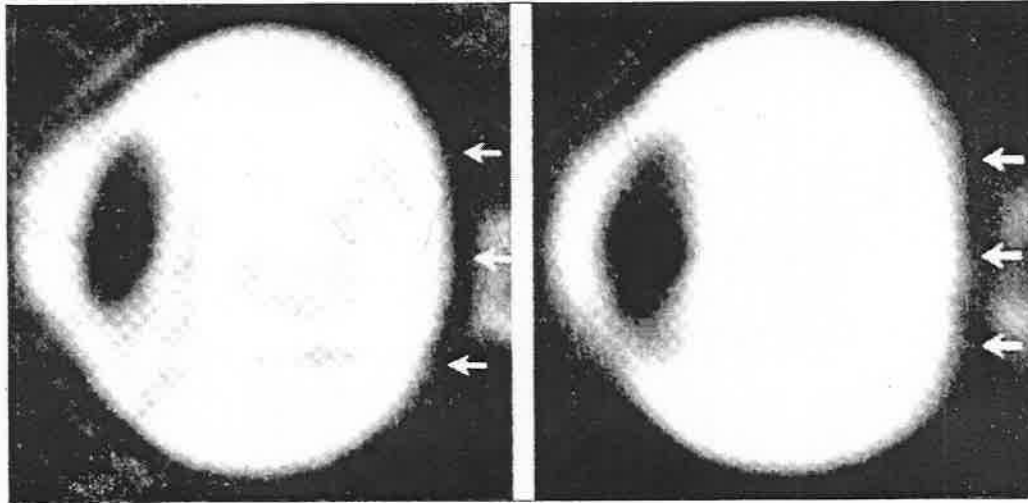
KENNETH CHANG

TRIPS to weightlessness can squash the eyeballs of astronauts, swell the optic nerves and blur vision—changes that often persist long after the astronauts return to weightbound Earth. That is one more health effect that NASA will have to worry about before astronauts venture farther out into the solar system.

“When you’re talking about missions that might be two years round trip, it has to be in the back of your mind that this could be a potential limiting factor,” said Dr Larry A. Kramer, a professor of diagnostic imaging and intervention at the University of Texas Health Science Center at Houston.

Kramer and his colleagues have put more than 35 astronauts into high-resolution magnetic resonance imaging machines. This month in the journal *Radiology*, they reported their findings on the first 27 astronauts they examined.

Four of the 27 had some swelling around the optic nerve. In seven of the astronauts, the back of one or both of the eyeballs was somewhat flattened. Those abnormalities, Kramer said, resemble those in patients on terra firma who



A normal eye before a spaceflight, left, and a flattened contour after

have a condition in which fluid pressure increases in the skull and presses against the eyes.

Kramer said he suspected increased pressure was at the heart of the problem for the astronauts, too. Without the downward pull of gravity, fluids in the body shift higher in the body, including inside the skull. (It is, however, too early to rule out other causes, he said, like the increased radiation that astro-

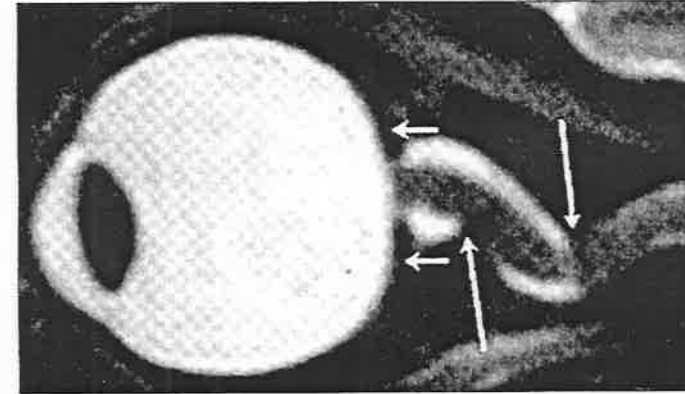
nauts experience while in orbit.)

The flattening of the eyes is easily compensated for by eyeglasses, and nearsighted people become less nearsighted. But the MRI scans also revealed little ripples in the back of the eyes of some of the astronauts, distorting their vision in a way that “would be more disconcerting to us,” Kramer said.

The swelling, if untreated, could damage vision, possibly even lead-

ing to blindness. The astronauts who had spent more time in space exhibited more abnormalities, although some of those who had floated in space for less than a month also had eye changes.

NASA is now taking measurements of the eyeballs of all new astronauts it selects and before and after each flight. “This is a lifelong health issue for astronauts that they’re going to be following,”



A flattened contour in another astronaut

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But since missions beyond low-Earth orbit are more than a decade

away, NASA has time to figure out solutions. Drugs to alleviate the pressure are one possibility. A more technologically challenging solution would be to spin interplanetary spacecraft to generate artificial gravity for the crew.

“NASA does not currently think that the vision problem will preclude long-duration human space missions,” said Dr Richard Williams, NASA’s chief health and medical officer, adding that the vision changes have so far had no effect on the ability of astronauts on the International Space Station to complete their missions. *NYT*