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A CASE DEFINITION IS NEEDED FOR THE SPACEFLIGHT ASSOCIATED NEURO-OCULAR
SYNDROME

Abstract

Recently, the degree of change in total retinal thickness (delta TRT) in space has been proposed as a quantitative metric for defining SANS. To test whether retinal thickening was reliably associated with other signs and symptoms of SANS, we analyzed preflight, inflight and postflight vision data on 30 astronauts from the Longitudinal Surveillance of Astronaut Health (LSAH). We compared inflight or postflight measurements to preflight values for changes in total retinal thickness, choroidal thickness, retinal nerve fiber layer thickness, spherical equivalent, cycloplegic spherical equivalent, visual acuity, optic disc edema, choroidal folds, globe flattening, cotton wool spots, disc protrusion, and nerve tortuosity.

From the results, we found that delta TRT was not continuously or reliably associated with the presentation of other SANS symptoms. For example, one individual had large decrements in visual acuity, optic nerve sheath dilation, optic disc edema, disc protrusion, globe flattening and choroidal folds yet had a delta TRT of only 4 and 14 microns in the right and left eye respectively. Another astronaut also had large decrements in visual acuity, along with optic nerve sheath dilation and globe flattening, yet the delta TRT was only 11 and 18 microns in the right and left eyes. On the other extreme, one individual had large changes in delta TRT (71 and 94 microns) along with globe flattening and optic nerve sheath dilation, but had no visual acuity changes. Another astronaut had a moderate delta TRT of 47 and 54 microns yet only presented with optic nerve sheath dilation and no other SANS signs and symptoms. Two individuals who exhibited a constellation of classic SANS symptoms had delta TRTs above 90 microns. Below that threshold, however, no linear relationship was apparent. Analysis of other continuous measures like choroidal thickness and RNFL also did not show continuous linear associations.

These results suggest that SANS is difficult to define. Although a single quantitative measure is desirable, some change in retinal thickness, choroid thickness, or RNFL may be expected during spaceflight and may not be reliably associated with other signs and symptoms of SANS. Multiple factors can contribute to SANS and a reliable case definition is needed to advance research into the factors associated with SANS.