NASA’s Number One Human Spaceflight Risk: The Visual Impairment Intracranial Pressure Risk. Pathophysiological Hypotheses (Vascular, CNS & Ocular)

1. A. Venous Cephalad Fluid Shift: Decreases Venous Compliance = ↑ICP

2. Cerebral Venous Congestion: Loss hydrostatic drainage = ↑ICP

3. Decreased CSF Absorption: Increased pressure gradient to CSF outflow = ↑ICP

4. Increased CSF Production: ↑Blood flow = ↑CSF Prod = ↑ICP

5. Interstitial Edema: ↑ICP = ↑Transcapillary Pressure = Interstitial Edema = Glympatic blockage = ↑ICP

6. Optic Nerve Head Pressure Gradient: compresses axons causing papilledema

7. Venous Compression: ↑ICP & expanding brain compresses venous sinuses exacerbating ↑ICP

8. Δ’s AQP1 Expression: inflight/postflight = ↑ICP

3. Ocular Venous Engorgement: Cerebral venous congestion transmitted to ocular venous supply acutely increasing IOP 2o to choroidal & episcleral engorgement. Trends down chronically?

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