Vision System Injury Repair and Mitigation

Maresin 1 (MaR1) Reduces Glial Cell Damage in Retina Injury Induced by Blast Wave Exposure

Maresin 1 (MaR1), one of a group of unique signaling molecules called specialized pro-resolving lipid mediators (SPMs) has been shown to attenuate the induction and accumulation of harmful mediators that lead to neuronal cell death in several neurodegenerative disease models (*Serhan, 2015*). To elucidate the role of MaR-1 in retinal cell survival following blast injury, researchers at the U.S. Army Institute of Surgical Research (USAISR; San Antonio, Texas) conducted a multi-phase study to validate a blast eye injury model and determine the acute (48 hours post injury) effects of MaR1 on structural changes in the retina after blast wave exposure. A compressed-air driven shock tube was used to expose anesthetized rats to shock waves simulating an open-field blast exposure. Approximately 30 minutes after exposure, the rats were treated with MaR-1, or a control intravenously. Unexposed rats were included as controls. Retinal tissue was collected and analyzed for relative levels of glial fibrillary acidic protein (GFAP), an indicator of damage to brain cells called glia (gliosis).

The results indicate that there is an increase in the level of GFAP throughout the retina of blast-exposed rats as compared to controls (Figure 1A), indicating that blast exposure induces retinal damage manifested as increased levels of GFAP. However, blast-exposed rats treated with MaR-1 showed a dose-dependent reduction in GFAP levels (Figure 1B) which suggests that MaR-1 intervention curbs increases in glial damage proteins (*Rios et al., 2018*). Thus, treatment with MaR-1 may provide an effective strategy to reduce or halt retina glia cell damage resulting from primary blast exposure. These findings introduce a target for pharmaceutical intervention and clinical translation for the protection of vision in the warfighter after exposure to explosive devices in combat.

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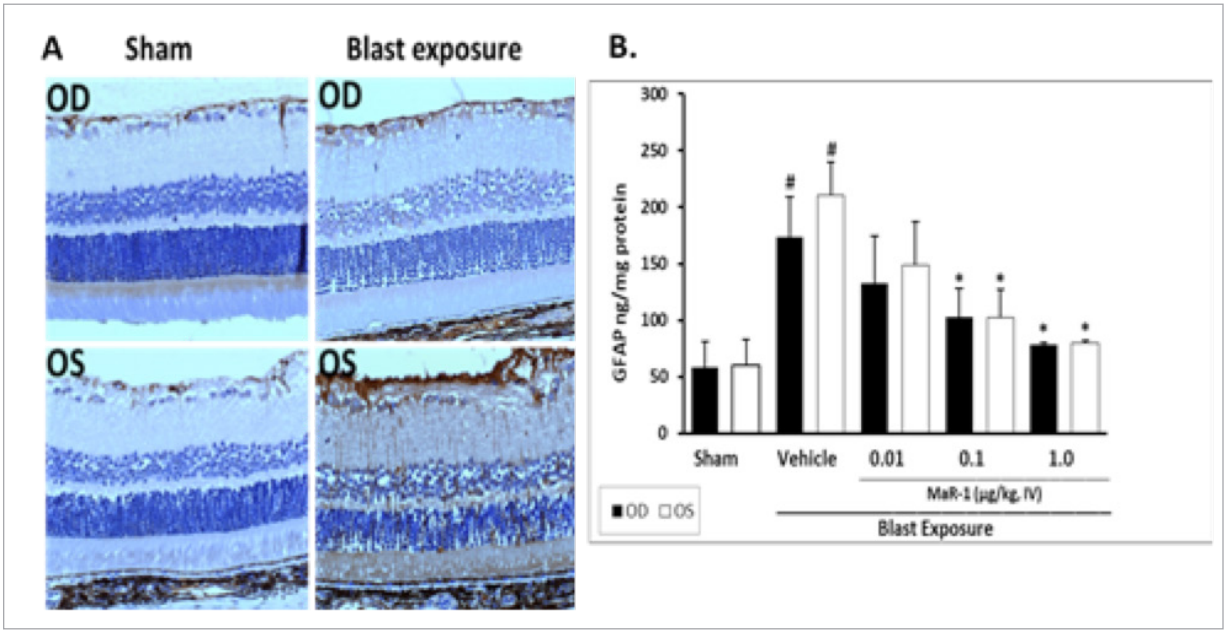

FIGURE 1A & 1B: GFAP expression in retinal tissues after blast exposure. (A) Increasing GFAP levels with blast exposure. (B) MaR1 reduced GFAP levels in the retina after blast exposure. (Figure used with permission from the authors)

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