

Abstract Submitted
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Traumatic eye injuries as a result of blunt impact CHIARA CLEMENTE, University of Cassino and Southern Lazio, LUCA ESPOSITO, PALMER - Scientific and Technology Park of Southern Lazio, NICOLA BONORA, University of Cassino and Southern Lazio, JEROME LIMIDO, JEAN-LUC LACOME, IMPETUS-AFEA, TOMMASO ROSSI, Ophthalmic Hospital of Rome — The detachment or tearing of the retina in the human eye as a result of a collision is a phenomenon that occurs very often. This research is aimed at identifying and understanding the actual dynamic physical mechanisms responsible for traumatic eye injuries accompanying blunt impact, with particular attention to the damage processes that take place at the retina. To this purpose, a numerical and experimental investigation of the dynamic response of the eye during an impact event was performed. Numerical simulation of both tests was performed with IMPETUS-FEA, a general non-linear finite element software which offers NURBS finite element technology for the simulation of large deformation and fracture in materials. Computational results were compared with the experimental results on fresh enucleated porcine eyes impacted with airsoft pellets. The eyes were placed in a container filled with 10 percent ballistic gelatin simulating the fatty tissue surrounding the eye. A miniature pressure transducer was inserted into the eye bulb through the optic nerve in order to measure the pressure of the eye during blunt-projectile impacts. Each test was recorded using a high speed video camera. The ocular injuries observed in the impacted eyes were assessed by an ophthalmologist in order to evaluate the correlation between the pressure measures and the risk of retinal damage.

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