The composition and function of the human eye have been studied for decades. However, there is still much to be discovered in relation to the structure and properties of the individual components of the eye and changes in these properties as a result of aging processes. One of the most important structures of the human eye is cornea. The cornea is a most important component of the eye with 70 per cent of the optical power, and it is one of the most sensitive organs of the body. The structure of the cornea is defined as a composite; it has six layers (Epithelium, Bowman's layer, Dua's layer, Stroma, Descemet's membrane, and Endothelium). It is well known that the cornea has viscoelastic material properties, which means that it has both elastic and viscous properties. The loading and unloading processes of viscoelastic materials by external force are not time reversible and are characterized by the occurrence of hysteresis. Hysteresis describes the differences in the course of deformation of the material during the increase and decrease of deflection force – for elastic bodies waveforms are identical. This fact often hampers a proper diagnosis of the eye, as in the case of glaucoma, where one of the indications for the occurrence of the disease is the increased level of intraocular pressure (IOP). The understanding of corneal biomechanical properties is a crucial for corneal refractive surgeries and diagnosis and monitoring of some ocular diseases (keratoconus, glaucoma). Furthermore the corneal biomechanical properties also have a significant influence on the tonometry measurement, which is used in ophthalmological diagnosis of glaucoma. Early diagnosis of glaucoma is an important issue, especially in the developed countries, where there is a significant aging of the population.

The main objective of this work was to determine the biomechanical properties of the cornea and to analyze age-related changes in biomechanical parameters calculated on the basis of biomedical data acquired in *in vivo* and *in vitro* experiments. I formed the following research hypothesis: "*Determination of biomechanical properties of the cornea extracted from biomedical data acquired in in vivo and in vitro experiments will allow assessing the changes in those properties associated with aging processes occurring in the eye. The research hypothesis also assumes that the biomechanical properties of porcine corneas will have a direct correspondence to the results for human eye, available in the literature.*"

The obtained results of the corneal deformation dynamics analysis have shown that the changes in the parameters estimated on the basis of the applied models are not only related to age, but have the potential to statistically differentiate / classify patients suffering from glaucoma and patients at early stage of the disease. However, introduction developed methods to clinical applications require a repetition of the experiments and analyzes of results for enhanced research groups. Summarizing, assessing the influence of age on the biomechanical properties of the cornea is important for understanding its function in the eye, investigating etiology and diagnosis of diseases, and in assessing the quality of corneal surgeries and treatments, corneal transplants, and collagen cross-linking. Undoubtedly, the outcomes of the proposed study contributed a new knowledge to the improvement of the eye diagnosis and numerical simulation of the corneal biomechanical behavior.