Thesis Project Form

Title (tentative):   Study of the possible formation of an emulsion in the eye during the filling phase of vitrectomy

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Description

Motivation and application domain

Vitrectomy is a surgical procedure during which the vitreous humour is removed from the eye and it is replaced with a silicone oil. One of the complications of this procedure is the formation of an oil emulsion. We will study the possible occurrence of an emulsion during the eye filling phase of the surgery.

General objectives and main activities

Emulsion of silicone oils in water is one of the main complications associated with vitrectomy. While we know that emulsification almost invariably occurs if the oil is left for long enough in the eye, little is known about the mechanisms leading to its formation. One of the hypothesis that has been advanced is that the emulsion can start during the eye filling phase. Moreover, it is widely accepted that the presence of biomolecules acting as surfactants plays a major role. We propose to study the process of eye filling with a silicone oil with in vitro experiments. We will consider the role of endogenous proteins released by the eye on this process.

Training Objectives (technical/analytical tools, experimental methodologies)

The student will learn basic experimental techniques related to the study of emulsion formation. The student will also write and use a software to analyse images of the emulsion, aimed at obtaining information about the size distribution of the droplets.

Place(s) where the thesis work will be carried out: ICMATE CNR

Additional information

Pre-requisite abilities/skills: Basic knowledge of fluid mechanics and experimental techniques

Maximum number of students: 1