

**Research Project Proposal**  
Academic year 2017-2018

<b>Project Nº 24</b>
<b>Title: Gold nanoparticles as biomarkers and its possible therapeutic applicability in retinal models of disease</b>
<b>Department/ Laboratory Experimental Ophthalmology Laboratory, Department of Ophthalmology UN-CUN</b>
<b>Director: Dra. Patricia Fernández Robredo</b> <b>Contact: pfrobredo@unav.es</b>
<p><b>Summary</b></p> <p>In recent years, ophthalmology has been revolutionized by advances in imaging technology, benefiting diagnosis and management of diseases like age-related macular degeneration, diabetic macular edema and retinal vein occlusion. In particular, optical coherence tomography (OCT) has provided a completely novel imaging modality providing a cross sectional view, displaying the layered structure of the retina (is typically 3-5 <math>\mu\text{m}</math> and has been likened to <b>in vivo clinical biopsy</b>). However, this imaging technique is not capable of distinguishing different cell types (e.g., macrophages within the retina). Fortunately, the emerging field of <b>nanotechnology</b> has the potential to address this issue. Gold nanoparticles (GNPs) are water soluble and biocompatible, so have potential for future use in humans. They scatter light more strongly than other biologic particles of similar size and can be combined with other molecules such as antibodies or peptides, so they can be targeted to a specific cell type or biochemical/pathologic processes such as apoptosis, ischaemia, wound-healing and infection. <b>The aim of the project is to investigate the feasibility of using GNPs as contrast agents to label invading inflammatory cells in the retina using ex vivo and in vivo murine models of retinal pathologies.</b> Methodology will include immunofluorescence detection of inflammatory cells in the retina with confocal microscopy and colocalization with the GNPs within the tissue by dark field microscopy and autometallography. State-of-the-art OCT device will be used and post-analysis of images obtained will be applied.</p>