Use of antimicrobial peptides and its nanogel formulations in the treatment of leishmaniasis

Ana Alves 1,2
georgina.alves@ibmc.up.pt

Background: Degree in Applied Biology and Master in Molecular Genetics, from School of Sciences, University of Minho, Braga, Portugal;
Starting year: 2014
PhD Advisors: Miguel Gama3; Ana Tomás 2,4,5
Research Team: Tânia Cruz 2; Karoline Melo3

1MIT Portugal Bioengineering Systems Doctoral Program, Department of Biological Engineering, School of Engineering, University of Minho; 2 Instituto de Investigação e Inovação em Saúde, Universidade do Porto; 3IBMC - Instituto de Biologia Molecular e Celular, Universidade do Porto; 3 Institute for Biotechnology and Bioengineering (IBB), Centre for Biological Engineering, University of Minho; 4 Instituto de Investigação e Inovação em Saúde, Universidade do Porto, IBMC - Instituto de Biologia Molecular e Celular, Universidade do Porto; 5ICBAS - Instituto de Ciências Biomédicas Abel Salazar, Universidade do Porto

Abstract
Parasites of the genus Leishmania are the causative agents of leishmaniasis, a neglected tropical disease endemic in many developing countries as well as in the Mediterranean area. Current treatments are inefficient, associated with high toxicity, severe side effects and most importantly, the high costs associated to the treatment are far from suitable for developing countries. In this sense, there is an urgent need to find new drugs and a new drug delivery system to treat leishmaniasis. Several studies have shown that antimicrobial peptides (AMPs), components of our immune system, are able to help the organism resist to the invasion of some pathogens, including Leishmania, by having a direct antimicrobial function as well as a capacity for immunomodulation. Their specificity to microorganisms and the low probability to develop resistance, make them very good candidates for the development of a new drug formulation. Our proposal during this project is to increase the solubility and bioavailability of selected AMPs, described in the literature as having an active effect against Leishmania. We showed that hyaluronic acid (HA) derivative nanogel has an ability to entrap hydrophobic peptides. HA is naturally present in vertebrate organisms and its viscoelastic properties, biodegradability, biocompatibility and absence of immunogenicity, make it suitable for pharmaceutical and medical applications.