

PhD: Food Science

Title: Development of antimicrobial peptides for food applications

Supervisor: Annarita Falanga

Objectives of the research project and interdisciplinary collaborations:

The aim of the research project is the development of antimicrobial peptides with bio-preservative properties encapsulated in biocompatible nanosystems such as liposomes for food applications.

This project will involve:

- 1- Development of stable antimicrobial peptides (AMPs) with bio-preservative features;
- 2- Analysis of peptide interactions with food components such as proteins and fats with the aim of understanding peptide stability to proteolytic degradation and peptide impact on food components;
- 3- Development of peptide-mimetic analogues to increase peptide stability;
- 4- Development and chimico-physical characterization of biocompatible nanosystems loaded with a selection of the most promising antimicrobial peptides for food applications;
- 5- Analysis of peptide release over time and eventual food interactions.
- 6- Analysis of the toxicological profile.
- 7- Analysis of the antimicrobial activity

The project will involve several multidisciplinary collaborations with other researchers both in the department or in other institutions. In fact, it will be necessary to involve experts in several microscopy techniques, such as Transmission Electron microscopy (TEM), Scanning Electron Microscopy (SEM) but also expert in cellular studies to verify the absence of toxicity and the antimicrobial activity.

Innovation and originality of the project in relation to the state of the art:

Chemical preservatives used for preserving fresh or processed foods present several drawbacks that lead to undesired texture and flavour. Indeed, bio preservation using antimicrobial peptides formulated with biocompatible nanotechnology principles represent a very attractive chance for food industries. The innovation is represented by the understanding of unknown mechanisms of interaction between AMPs and food to achieve a system useful for food use.

Grant availability:

Prin 2022, title, Versatile lOaded Thera pAtch for Wound Skin Infections.

Prin 2022 PNRR, title, RNA Aptamer development for epigenetic control in neuropathic pain with specific delivery system: from theoretical to in vivo studies.

Collaborations with foreign institutions:

We have already several long-standing collaborations with foreign institutions that are expert in the development of nanosystems with antibacterial activity. In particular, we will collaborate with Paula Ortega of the Alcala University, Madrid, Spain, where the PhD student will spend a period of study and research.