Projects or Research lines ----------

Offer name	Description
Design of antinociceptive peptides by grafting domains of Nav toxins	Neurotoxic peptides have been pointed out as antinociceptive therapeutic leads. Venom peptides have modulation properties on isoforms of voltage-gated sodium channels (VGSC) associated with pathologies such as neuropathic or inflammatory pain. The β-neurotoxins obtained from scorpion venoms are peptides that can alter the kinetics of VGSC by binding to its receptor site 4. We use computational methods and the amino acid sequence of the novo recombinant neurotoxins to graft some of their existing amino acid domains to generate chimeric peptides with antinociceptive activity. Peptide variants with antinociceptive activity in inflammatory and neuropathic pain models with an effect comparable to the mu-opioid receptor agonists DAMGO (H-Tyr-D-Ala-Gly-N(Me) Phe-Gly-ol) have been found. We look for collaborative research in this scientific field.

Production and extraction of biodegradable plastics using genetically modified Azotobacter vinelandii strains.	This project proposes developing bioplastic production and recovery processes based on environmentally friendly technologies that allow for the production of unaltered polymer granules. They will be based on the use of strains modified to allow for facilitated polymer release, as they are susceptible to autolysis or cell rupture.
Development and physicochemical and biopharmaceutical characterization of transdermal patches loaded with therapeutic drugs for the treatment of diseases.	Design, preformulate, formulate, and optimize transdermal systems based on patches (matrix, unilaminar, multilayer, reservoir type) loaded with therapeutic substances of interest for the treatment of diseases.
Biodegradable polymeric microneedles loaded with therapeutically relevant actives: Development and physicochemical and biopharmaceutical characterization.	Design, preformulate, formulate, and optimize transdermal systems based on microneedles (solid and biodegradable polymeric) loaded with therapeutic substances for the treatment of diseases.

Development and optimization of polymeric nanoparticles loaded with therapeutic and/or cosmeceutical active agents for the treatment of skin diseases.	Develop and optimize polymeric nanoparticles loaded with therapeutic and/or cosmeceutical active ingredients for the treatment of skin diseases.
Physical mechanisms (iontophoresis, sonophoresis, electroporation, microneedles, etc.) and chemical mechanisms (penetration enhancers) to improve the passage of drugs through biological membranes (skin and mucous membranes).	Use of physical mechanisms (iontophoresis, sonophoresis, electroporation, microneedles, etc.) and chemical mechanisms (penetration enhancers) to improve the passage of drugs through biological membranes (skin and mucous membranes).
Formulation and characterization of buccal drug delivery systems.	Formulate and characterize oral drug delivery systems.

Development of Ophthalmic Systems (Contact Lenses) for Drug Delivery.	Develop ophthalmic systems (contact lenses) for drug delivery.
Molecular mechanisms of symbiotic colonization in legumes	In our group we are interested on deciphering the molecular components of legumes recruited during the symbiotic colonization of microbes, particularly in the legume-rhizobia mutualistic association. For this purpose we employ a wide collection of Lotus japonicus mutants, molecular biology techniques and a growing collection of microbe species.
Mechanisms of mutualist endophyte fungi infection	We are interested in determining the molecular mechanisms that mutualistic fungi use to invade tomato, with an emphasis on identifying effector functions and targets within the plant.
Functional analysis of microbial expansins	Expansin genes are present in important phytopathogens including bacteria, fungi, oomycetes and nematodes. We are characterising their function in relation to microbial plant infection.

Collaborative academic event generation on the development of tools for medical diagnosis based on AI.	Please receive the following proposal which aims to initiate collaborative efforts between UNAM and Dougguan Technological University in China. The common ground is the creation of collaborative academic events focused on the development of tools for medical diagnosis based on AI. UNAM China will bring researchers in this field, and UNAM Mexico will work closely with the research group: Biomedical AI Laboratory of the UNAM Institute of Biomedical Research. It is possible to start with an initial contact between the researchers from UT Dougguan and the researchers from the Biomedical AI Laboratory research group. The objective of this event is for both research groups to get to know each other and present research progress to determine if collaboration is feasible. At this event, CVTT will present real interests from the Health Sector regarding AI-based medical diagnosis, and UNAM China will be asked to do the same. The goal is to foster joint
Control of insect vectors of diseases and urban pests	We develop technology for the control of insect vectors of diseases in humans such as mosquitoes and Chagas bugs, as well as control of urban pests. This includes counseling and control programs.

Biological and Medical Applications	Covers research in biomathematics, immunotechnology, nanomedicine, and the development of nanostructured bioceramics.