5-Year Integrated
M.Sc. in Biomedical Science
Semester VI
Project Presentations

23rd March 2019
Title

Exploring the diversity of bacteria in oral cavity of oral cancer patients and long term tobacco chewers using restriction fragment length polymorphism

Students

• Ms. Kinjal Jain
• Ms. Dwisha Jain

Project Mentors:

Ms. Shriya Sawant
Dr. Harinder Singh
Summary of the Project

- Prevalence of oral cancer in India is very high. Also, there is a lack of knowledge regarding oral microbiome of Indian population, especially long term tobacco chewers.

- In the present study, 16S rRNA gene specific PCR was performed, followed by Restriction Fragment Length Polymorphism analysis to explore the oral bacterial diversity of different sample group.

- The composition was different in oral cancer sample groups, as compared to control samples.
Title

Cloning of the phytase gene of *Escherichia coli* using recombinant DNA technology

**Students**

- Ms. Krystelle D’souza
- Ms. Devanshi Shah

**Project Mentors:**

Ms. Asmita Kamble
Dr. Harinder Singh
Summary of the Project

- Phytate as a substrate, present in plants, constitutes a major portion of our diet. However, monogastric animals lack phytase enzyme which has the potential to utilise phytate as the substrate.
- In the present study, optimization of phytase gene cloning was performed.
- Phytase gene from Escherichia coli was PCR amplified, restriction digested, ligated in the vectors pET-28b and pET-29b, and transformed in bacterial host.
Title
Biogenic approach for synthesis of zinc oxide nanoparticles using *Trigonella foenum-graecum* (fenugreek)

Students
- Ms. Kshiti Vaishnav
- Ms. Samruddhi Jadhav

Project Mentors:
Mr. Mitesh Joshi
Dr. Purvi Bhatt
Summary of the Project

• The project was aimed towards using biogenic approach to synthesize zinc oxide nanoparticles (ZnONPs) using *Trigonella foenum-graecum* (fenugreek) leaves.

• The synthesized ZnONPs were characterized using UV-Visible Spectrophotometer, Fourier transformation Infrared Spectrophotometer (FTIR) and Zeta potential followed by determination of the colloidal stability of the synthesized nanoparticles.
Title

Plant-extract mediated synthesis of zinc oxide nanoparticles using *Tinospora cordifolia*

Students

- Ms. Urja Parekh
- Ms. Richa Thakur

Project Mentors:

Mr. Mitesh Joshi
Dr. Purvi Bhatt
Summary of the Project

• The project was aimed towards using green synthesis method to synthesize zinc oxide nanoparticles (ZnONPs) using *Tinospora cordifolia* (giloy) stem extract.
• The synthesized ZnONPs were characterized using UV-Visible Spectrophotometer, Fourier transformation Infrared Spectrophotometer (FTIR) and Zeta potential followed by determination of the colloidal stability of the synthesized nanoparticles.
Title

Development of emulsion-based drug delivery system for encapsulation of methotrexate

Students

• Ms. Drishya Antony
• Ms. Sanghita Rajkumari
• Mr. Sarthak Rao

Project Mentors:
Ms. Amrutha Parmar
Dr. Brijesh S.
Summary of the Project

- The aim of the project was to develop an emulsion-based drug delivery system for encapsulation of methotrexate.
- Initially, an HPLC method for methotrexate was developed and validated.
- FTIR studies showed no interaction between the excipients and the drug.
- Pseudo-ternary phase diagrams for the selected oils, S mix (surfactant + co-surfactant) and water were constructed for preparation of emulsions using following mixtures in 1:1 ratio:
  - Capryol 90 + Tween20 + Propylene Glycol
  - Capryol 90 + Tween20 + Transcutol
- Methotrexate was loaded in the prepared emulsions and the entrapment efficiency was found to be above 50%.
Title
Development of quercetin-loaded solid lipid nanoparticles

Students
• Ms. Urvi Mishra
• Ms. Sayoni Chatterjee

Project Mentors:
Ms. Yashika Mirchandani
Dr. Brijesh S.
**Summary of the Project**

- The aim of the project was to develop quercetin-loaded solid lipid nanoparticles (SLN).
- FTIR studies showed no interaction between the excipients and the drug.
- High speed homogenisation technique was used to synthesize the SLN.
- Characterization studies showed particle size of 219.8 nm with PDI of 0.125 and zeta potential of $-30\,\text{mV}$ for the synthesized SLNs.
- The entrapment efficiency of quercetin within the SLN was calculated to be 70.3%.

**Solid Lipid Nanoparticle:** Lipid monolayer enclosing a solid lipid core.

**DLS showing size of the synthesized SLN**
Title
Clocking the human pluripotent stem cell differentiation

Students
• Ms. Soumyaa Thakur
• Ms. Prachi Storewala
• Ms. Upasna Basak
• Ms. Nitya Jalan

Project Mentors:
Ms. Jasmeet Kaur Virdi
Ms. Divya Desai
Ms. Niloufer Dumasia
Dr. Prasad Pethe
Summary of the Project

• The objective of the study was to understand expression of circadian genes in differentiated and undifferentiated stem cells.

• Results indicate expression of CLOCK and BMAL-1 in the beginning at the time of formation of heterodimer.

• These then activates transcription of PERIOD and CRYPTOCHROME which leads to repression of the heterodimer.

• Thus, active expression, by the embryonic stem cells, of circadian associated genes and their cyclicity, was observed.