Summer Student Research Program
Project Description

FACULTY SPONSOR'S NAME AND DEGREE: Nikhat Parveen
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PROJECT TITLE (200 Characters max):

Cloning of Treponema pallidum genes and purification of recombinant proteins to be used for generation of antibodies in mice

HYPOTHESIS:

One or more of the selected proteins will be differentially recognized by syphilis patients at different stages of infection

PROJECT DESCRIPTION **(Include design, methodology, data collection, techniques, data analysis to be employed and evaluation and interpretation methodology)**

All candidates will learn to prepare medium, buffers and learn techniques associated with Molecular Biology, Microbiology, pathogenesis, biochemistry and data analysis approaches. Microscopic examination of bacteria and parasite will also be used by the student. He/she will be responsible for cloning of the genes amplified by PCR using Treponema pallidum genomic DNA either in shuttle vector or in protein expression vector. Cloning of the correct size genes will be determined after purification of plasmid by restriction digestion followed by agarose gel electrophoresis. Gene presence will be confirmed further by DNA sequencing and analysis. Genes cloned in protein expression vector will be used to induce and purify polyhistidine tagged proteins. Purified proteins will be resolved by SDS-PAGE and if successful, used for immunization of mice to generate specific polyclonal antibodies. If time permits, student will also learn serological techniques with sera generated.

SPONSOR'S MOST RECENT PUBLICATIONS RELEVANT TO THIS RESEARCH:

1. Chan, K., Nasereddin, T., Alter, L., Centurion-Lara, A., Giacani, G., and **N. Parveen**.* 2016. "*Treponema pallidum* Lipoprotein TP0435 Expressed in *Borrelia burgdorferi* Produces Multiple Surface/Periplasmic Isoforms and mediates Adherence". Nature Scientific Reports 6:25593. doi:10.1038/srep25593.
2. Akoolo, L., Schlachter, S., Khan, K., Alter, L., Rojtman , A. D., Gedroic, K., Bhanot, P., and **N. Parveen**.* 2017. A novel quantitative PCR detects Babesia infection in patients not identified by currently available non-nucleic acid amplification tests. BMC Microbiology 17:16-24. doi:10.1186/s12866-017-0929-2
3. Akoolo, L., Djokic, V., Rocha, S.C., and **N. Parveen**.* 2021. Pathogenesis of *Borrelia burgdorferi* and *Babesia microti* in TLR4-Competent and TLR4-Deficient C3H Mice. Cellular Microbiology. 2;e13350.doi: 10.1111/cmi.13350.
4. Primus, S., Rocha, S.C., Giacani, L., and **N. Parveen**.* 2020. Identification and functional assessment of the first placental adhesin of *Treponema pallidum* that may play critical role in congenital syphilis. Frontiers in Microbiology. 11:621654. doi: 10.3389/fmicb.2020.621654
5. Carcamo, C. P., Velasquez, C., Rocha, S. C., Centurion-Lara, A., Lopez-Torres, L., and **N. Parveen.*** 2024. Sociodemographic and clinical characteristics associated with maternal and congenital syphilis - A prospective study in Peru. International Journal of Infectious Diseases, 143:107041. https://doi.org/10.1016/j.ijid.2024.107041

THIS PROJECT IS: ☐ **Clinical** ☒ **Laboratory** ☐ **Behavioral** ☐ **Other**

THIS PROJECT IS CANCER-RELATED ☐ **No**
Please explain Cancer relevance

THIS PROJECT IS HEART, LUNG & BLOOD- RELATED ☐ **No**

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Please explain Heart, Lung, Blood relevance

THIS PROJECT INVOLVE RADIOISOTOPES?☐ No

THIS PROJECT INVOLVES THE USE OF ANIMALS ☐ No
PENDING ☐ APPROVED ☐ IACUC PROTOCOL #

THIS PROJECT INVOLVES THE USE OF HUMAN SUBJECTS? ☐ No
PENDING ☐ APPROVED ☐ IRB PROTOCOL # M

THIS PROJECT IS SUITABLE FOR:

UNDERGRADUATE STUDENTS	☐	ENTERING FRESHMAN	☐
SOPHMORES	☐	ALL STUDENTS	☒

THIS PROJECT IS WORK-STUDY: Yes ☒ or No ☐ Student without work-study will be accepted if resources are available.

THIS PROJECT WILL BE POSTED DURING ACADEMIC YEAR FOR INTERESTED VOLUNTEERS: Yes ☒ or No ☐

WHAT WILL THE STUDENT LEARN FROM THIS EXPERIENCE?

Student will get exposure to hypothesis-driven research. In addition to the scientific experience student will gain from the project described above, he/she will learn how to conduct research in an ethical manner in the laboratory, maintenance of proper records, attain experience in analyzing data and explaining results to scientific audience, and interaction with other researchers in the laboratory will help him/her to participate in scientific discussions.