Project Title: Study the impact of Low Temperature Plasma on modulation of growth pattern and cells cell cycle perturbation of skin associated cells.

Project Reference Code: Vig-ASU

Name of Project Leader: Dr. Komal Vig (Dr. Zafaryab, Postdoc)

Host Facility: Alabama State University

Internship Location: Lab Name: Vig Lab, Room No-333, Department of Biological Sciences

Host Facility Location: Alabama State University, 915 S. Jackson Street, Montgomery, AL 36104

Project Description (roughly 300 words):

The skin, the biggest organ in the human body, serves as the body first line of defense against trauma, chemical and physical harm, and microbial invasion. However, the skin requires quick wound healing when this line of defense is compromised by mechanical or chemical harm. The intricate and dynamic process of wound healing is typically divided into four phases: hemostasis, inflammation, proliferation, and tissue remodeling. Keratinocytes are one type of cell that proliferates and migrates to the site of injury when growth factors are induced. Low Temperature Plasma (LTP), which can generate electronic ion electric fields, ultraviolet and infrared radiation, reactive oxygen species (ROS), and reactive nitrogen species (RNS. The physiological amount of ROS (primarily hydrogen peroxide) produced by plasma entering cells is a crucial redox signaling factor that participates in cell metabolism regulation and stress response to help cells adapt to changing environments and pressures. It also emits signals through particular protein targets. ROS (H_20_2) generated from low dose of plasma can act as signaling molecules that can promotes cell proliferation. In current project, different doses of LTP will be used to treat the cells and ROS generation will be estimated at different time scale to choose specific dose which promotes the cell proliferation most. Cell proliferation will be evaluated by MTT and fluorescence microscopy assy. Further treated cells will be evaluated for cycle analysis using Flow Cytometer.

Disciplines: Biomedical

Importance:

Numerous therapeutic approaches for wound healing are used in clinical practice, including the most popular medication therapy, growth factor therapy, epidermal stem cell transplantation, spray and stem cell therapy, etc. Despite the variety of approaches, there are still a number of drawbacks, including medication resistance, high cost, and complicated operation. New therapies are therefore desperately needed to encourage wound healing, particularly for complicated chronic wounds. Chronic wound can be overcome by Low Temperature Plasma using specific dose to accelerate the keratinocyte cell proliferation and migration.

Requirements:

- Preferred Major
  - If necessary, if accepting any STEM students please state so.
- Class work
  - Physics, math, or other background (list if specific level of classes are necessary)

- Programming knowledge
    - List NA if no prior knowledge of programming is required. List preferred language of programming if applicable.
- Software knowledge
    - List NA if no prior knowledge of programming is required. List preferred software if applicable.
- Other

Biography (roughly 100-150 words):

Dr. Komal Vig working as Professor of Biology at Alabama State University. She obtained her Bachelor`s and Master`s degrees in Zoology from University of Delhi, India. Dr. Vig received her Ph.D. degree in Environmental toxicology from University of Delhi in India. She joined *Commonwealth Scientific and Industrial Research Organisation (*CSIRO), Australia as a Visiting Postdoctoral Scientist after her Ph.D and worked with remediation group on remediation of contaminated sites. Dr. Vig current working in fields of biomedical application of Low Temperature Plasma (LTP). She is using LTP as biomedical tool to inactivate RSV virus and bacteria. She is working other aspect of LTP including functionalization of biomaterial for enhancing the bio-efficacies of biomaterial.

Is U.S. citizenship required to participate in this project? No.

Contact information:

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Internship Coordinator/ HR manager:

Dr. Komal Vig (komalvig@alasu.edu)