Infections caused by fungi are a growing concern, particularly as fungal pathogens can affect both animals and humans, sometimes leading to life-threatening diseases. Developing new strategies to strengthen the immune system against such infections is a key focus of modern biomedical research. One promising area of exploration involves the role of diet and nutrition in enhancing immune responses. In this project, we aim to study how certain lipids in the diet, known as fatty acids (FAs), might help organisms resist fungal infections.

To conduct this research, we will use the larvae of the wax moth, ***Galleria mellonella***, a species widely used as a model in scientific studies. These larvae have an immune system that shares some key features with the human immune system, making them an excellent and ethical model for studying basic biological processes. Their relatively short lifespan and ease of care make them particularly useful for dietary and immune response research.

The study will investigate whether feeding these larvae with food supplemented with fatty acids enhances their ability to resist infections caused by a specific fungal pathogen, *Conidiobolus coronatus*. This fungus infects humans and other mammals such as horses and sheep leading to conidiobolomycosis. It is also a natural threat to insects and serves as a model organism for studying fungal infections. By exposing larvae to the fungus and comparing their immune responses with and without fatty acid supplementation, we hope to uncover whether and how these dietary fats protect against infection.

Our research will delve into the mechanisms behind this protection. Specifically, we will examine changes in the larvae's hemolymph, which is analogous to human blood, and their immune cells, which play a vital role in fighting infections. We will also investigate potential biomarkers of conidiobolomycosis (immunity shaping) and how fatty acids might influence the activity of immunoreactive proteins and molecular processes associated with immunity and stress responses.

This project is important because it not only seeks to improve our understanding of the interplay between diet and immunity but could also pave the way for practical applications. Findings from this research may eventually lead to the creation of dietary supplements or therapeutic strategies aimed at enhancing the immune system in both humans and animals. Findings from this research may eventually lead to the creation of dietary supplements or therapeutic strategies aimed at enhancing the immune system in both humans and animals.

In addition to advancing scientific knowledge, this project demonstrates the power of using simple model organisms, such as ***Galleria mellonella***, to answer complex biological questions. Through this research, we hope to contribute valuable data to the growing field of nutritional immunology and inspire new approaches to combating fungal infections sustainably and innovatively.