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Development of Nanomedicines for Tuberculosis Treatment

Project Number
5K43TW010371-04

Contact PI/Project Leader
DUBE, ADMIRE

Awardee Organization
UNIVERSITY OF THE WESTERN CAPE

Description

Abstract Text

Project Summary: Sub-Saharan Africa, in particular South Africa is disproportionately challenged by a burden of deadly **infectious** diseases including tuberculosis (TB). South Africa has the highest burden of TB in the world (22.5% of the global burden). Furthermore, TB that is resistant to existing drugs is on the rise. However, there are very few new drugs for TB in the drug discovery pipeline. Further, it is not encouraging to note that in the current era of increasing antimicrobial resistance, new drugs are faced with a real threat of pathogen resistance emerging soon after clinical use; as was recently observed with bedaquiline, whereby resistance was detected 2 years after clinical use. The combination of increasing multidrug resistance, global population density and international travel urgently calls for the development of novel therapeutics for TB. Under this 5-year mentored K43 award, I intend to investigate a new treatment modality that employs nanoparticles to activate the innate immune system for treatment of TB (immuno-therapy). As a Postdoctoral fellow in nanomedicine at the University at Buffalo, we synthesized nanoparticles functionalized with an immune modulating ligand (β-glucan), and demonstrated that these nanoparticles could stimulate the TB host cells, i.e. macrophages, to produce cytokines and oxidative species known to be critical to the eradication of the TB causative organism Mycobacterium tuberculosis (M.tb). Under this award, I will determine whether this cellular response leads to death of M.tb in macrophages and mice. This study will generate proof of concept data towards the development of this new treatment modality. My prior training in nanomedicine was focused on the synthesis of nanoparticles and how to characterize them. However, my career objective is to be a leader in the development of nanomedicines for the treatment of **infectious** diseases. Therefore, I intend to undergo extensive training in the biology and immunology of **infectious** diseases and pharmacokinetics, and to also improve my research leadership skills. I will gain these skills through completing didactic and hands-on training courses and group learning. I believe these additional skills will complement my current skills (in nanoparticle synthesis), to equip me to rationally design nanomedicines and effectively collaborate with **infectious disease** medical experts throughout my career. My mentorship team comprises established researchers in TB biology and immunology and nanotechnology (South Africa mentors) and drug development (US mentor). I will leverage the scarce resources such as biosafety level 3 facilities as well as the excellent teaching and research environment at institutions in South Africa and the US, to successfully complete my training and research goals.

Public Health Relevance Statement

Project narrative: The overall goal of this project is to provide advanced training to equip Dr. Admire Dube (a scientist in nanotechnology) with skills and competencies in the biology and immunology of infectious diseases. These skills will equip Dr. Dube to establish a research career in the development of nanomedicines for the treatment of infectious diseases. The burden of infectious diseases is a global concern, particularly in Africa where Dr. Dube is resident.

NIH Spending Category

Antimicrobial Resistance **Bioengineering** **Emerging Infectious Diseases** **Immunotherapy** **Infectious Diseases** **Lung** **Nanotechnology** **Orphan Drug** **Rare Diseases** **Tuberculosis**

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Educational process of instructing Ensure Environment Generations Glucans Glycolates Goals Histopathology Human Immune Immune system Immunology Immunotherapy Incubated Individual **Infectious Disease** Immunology Inflammatory Innate Immune System Institution

Read More

Details

Contact PI/ Project Leader

Name
DUBE, ADMIRE

Title
ASSOCIATE PROFESSOR

Contact
adube@uwc.ac.za

Other PIs

Not Applicable

Program Official

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Organization

Name
UNIVERSITY OF THE WESTERN CAPE

City
Bellville

Country
SOUTH AFRICA (SF)

Department Type
Unavailable

Organization Type
Unavailable

State Code

Congressional District

Other Information

FOA
PAR-17-001

Study Section
International and Cooperative Projects - 1 Study Section[ICP1]

Fiscal Year
2020

Award Notice Date
17-March-2020

Administering Institutes or Centers
FOGARTY INTERNATIONAL CENTER

DUNS Number
568594589

CFDA Code
989

Project Start Date
22-August-2017

Project End Date
31-March-2022

Budget Start Date
01-April-2020

Budget End Date
31-March-2021

Project Funding Information for 2020

Total Funding
$76,165

Direct Costs
$70,523

Indirect Costs
$5,642

Year	Funding IC	FY Total Cos
2020	FOGARTY INTERNATIONAL CENTER	$76,165

NIH Categorical Spending

Click here for more information on NIH Categorical Spending

Funding IC	FY Total Cost by IC	NIH Spending Category

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Sub Projects

No Sub Projects information available for 5K43TW010371-04

Publications

No Publications available for 5K43TW010371-04

Patents

No Patents information available for 5K43TW010371-04

Outcomes

The Project Outcomes shown here are displayed verbatim as submitted by the Principal Investigator (PI) for this award. Any opinions, findings, and conclusions or recommendations expressed are those of the PI and do not necessarily reflect the views of the National Institutes of Health. NIH has not endorsed the content below.

No Outcomes available for 5K43TW010371-04

Clinical Studies

No Clinical Studies information available for 5K43TW010371-04

News and More

Related News Releases

No news release information available for 5K43TW010371-04

History

No Historical information available for 5K43TW010371-04

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