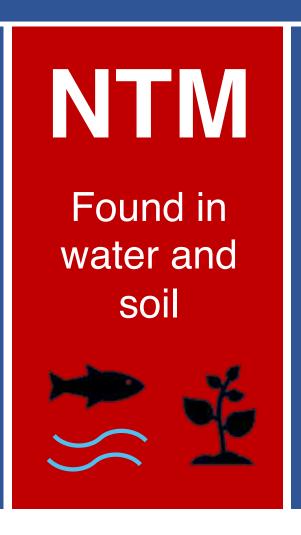
Turning Down the Dial on Tuberculosis and Non-tuberculous Mycobacteria

Alexandra Chirakos, Lab of Dr. Patricia Champion University of Notre Dame, Department of Biological Sciences







Increasing incidence

Hard to diagnose and treat



TUBERCULOSIS

Pathogenic Mycobacteria Infection and Death Mycobacteria without ESX-1 weapon Trapped and killed No disease, vaccine protection ESX-1 No disease, no vaccine protection

TB Cases and Incidence Rates

10-YEAR PERIOD: 2009-2018

Incidence rate per 100,000 population

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All 154 to 255

2 55 to 4 8 88

Rates based upon <20 cases are unstable

2018 population estimates were unavailable at the time of publication. The 2017 Ceresus estimates were used in place of 2017 estimates

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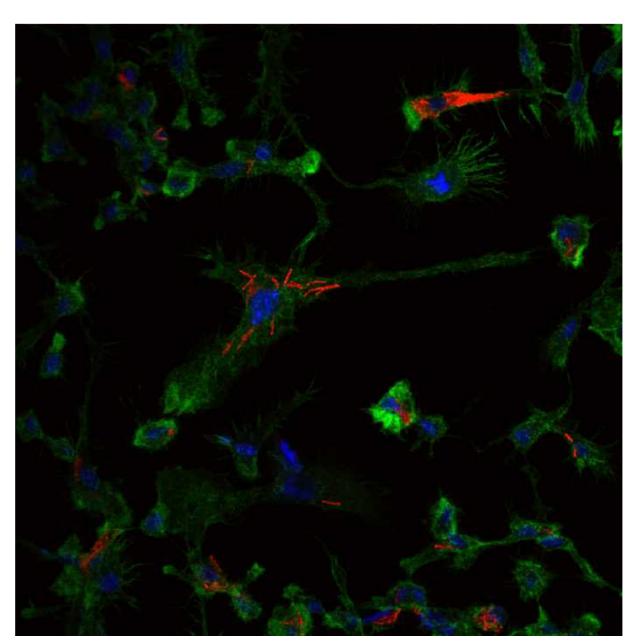
Non-tuberculous Mycobacteria (NTM's)

- Everyone inhales them, but only a small fraction of people get disease, unclear why.
- NTM's are not contagious, unlike TB.
- Increasing rate of infection 10% each year since 2008, especially in women and people over 65.
- People with COPD, cystic fibrosis and individuals who are <u>immunocompromised</u>, or undergoing <u>cancer treatment</u> are most at risk.
- Indiana has a high prevalence and low screening rate for NTM infections

Tuberculosis is the #1 infectious disease killer globally

- Highly contagious
- passed from person to person by cough
- Most Americans are not vaccinated against tuberculosis
- TB is rapidly gaining resistance to antibiotics.
- All 50 states continue to report cases of tuberculosis each year, and there were 116 new cases of TB in Indiana in 2018, two of which were resistant to antibiotics.

We study how tuberculosis and NTM bacteria infect your body. These bacteria have <u>a special</u> weapons system called ESX-1 that they use to survive and escape your white blood cells during infection.



Doctors and scientists previously thought that the bacteria could turn this weapon on and off like a light switch.

However, my research has shown that it is more like a <u>dial</u>: you can tune it up or down, and there are varying degrees of virulence.

My lab has found two components that turn down the bacteria's ability to infect us.

This is useful information for <u>drugs and</u> <u>vaccines</u> against NTM's and tuberculosis.

Left: A Confocal Microscopy Image of Pathogenic *Mycobacteria* inside a white blood cell