# Meet Elizabeth Gibson

*A 2017 AAPS Foundation fellowship recipient works on antibacterial-drug-resistant tuberculosis.*

***Elizabeth Gibson is a third year student at Vanderbilt University, where she works under the guidance of Neil Osheroff, Ph.D. With the support of the AAPS Foundation, she can continue her work on*** Novel Naphthyridone/Aminopiperidine-Derived Type II Topoisomerase-Targeted Antibacterials.

Antibacterial drug resistance is on the rise across the globe. It is estimated that by 2050, 10 million people will die per year because of antibacterial drug resistance. Overprescribing of antibacterials is one of the major factors leading to resistance, enhanced by a 40 percent rise in antibacterial prescriptions from 2000 to 2010. Drug intolerance among patients is another factor, resulting in patients stopping their medications mid-course, leading to nonlethal antibacterial doses and development of resistance.

Antimicrobial resistance is particularly prevalent among individuals with tuberculosis (TB). TB is one of the leading causes of mortality worldwide. In 2014, an estimated 9.6 million people developed TB and 1.5 million died from the disease. It is not only deadly, but costly to the economy as well. Worldwide by 2050, it will cost the economy an extra $100 trillion. According to the Centers for Disease Control, patients pay $45,000 in both direct costs and productivity loss for nonresistant TB. If the strain of TB is resistant, the costs go up to $200,000 to $700,000 based on the level of resistance. Of these reported cases, an estimated 480,000 developed multidrug-resistant TB.

The current standard of treatment is the RIPE regimen: rifampin, isoniazid, pyrazinamide, and ethambutol. Fluoroquinolones (FQs) are added to this regimen when resistance is detected. However, the emergence of strains of TB that are resistant to FQs has given rise to extensively drug-resistant TB. Due to overprescribing FQs, many patients have already been exposed to FQs, increasing FQ-resistant TB strains in the general population.

I hope to pave the way for novel antibacterials that combat drug resistance but work against validated drug targets. My current research focuses on *Mycobacterium tuberculosis*, the bacteria that causes TB. I am collaborating with the GlaxoSmithKline Tres Cantos facility in Spain. This section of GlaxoSmithKline works on diseases of the emerging world to develop new treatments for diseases that affect poor countries. I want to discover the mechanism of the current classes of compounds (*Mycobacterium tuberculosis* gyrase inhibitors and novel bacterial topoisomerase inhibitors). I hope this research leads to more work on antibacterials for these hard-to-treat infections and eventually to medications on the market that these lower-income countries can afford to bring to patients.

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