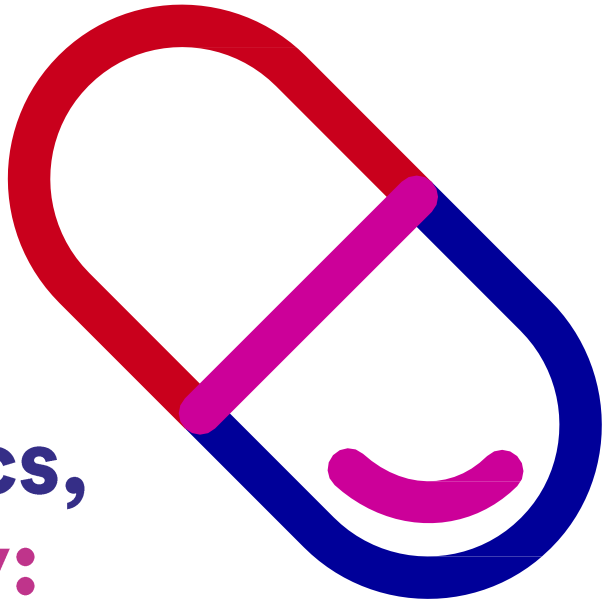
Johnson & Johnson



Protect Antibiotics, Protect Humanity:

Safeguarding Medicines for Multidrug-Resistant Tuberculosis (MDR-TB) Treatment

Antimicrobial resistance (AMR) is one of the greatest public health threats facing the world today. Due to various factors including overuse and misuse, antibiotics are increasingly losing their effectiveness against the very diseases they are supposed to treat.

It is estimated that in 2019, there were 1.27 million deaths directly attributable to AMR, nearly the same number of global deaths as HIV and malaria combined[1]. By 2050, the number of AMR-related deaths could rise to 10 million deaths annually[2]. COVID-19 brought new urgency to address AMR given delayed diagnosis of drug-resistant infections, interruptions in access to primary healthcare and supply chain gaps. Given that 10-15 years is the average time needed to develop a new antibiotic, it's clear that we need to act—now—to protect medicines so that they can continue protecting us in the future.

Tuberculosis: The Biggest Contributor to AMR

Drug-resistant tuberculosis (DR-TB) accounts for approximately one-third of all AMR-related deaths[3]. Currently, only one in three people with DR-TB is diagnosed[4], and every untreated individual has the potential to infect up to 15 additional people over the course of a year, posing a major threat to global health security[4]. Therefore, outpacing AMR will require a concerted effort to address DR-TB.

Johnson & Johnson is committed to supporting this effort. When we first introduced our MDR-TB medicine in late 2012, it was the first TB medicine with a novel mechanism of action in almost 50 years[5]. Today, the medicine is recommended by the World Health Organization (WHO) as a core component of shorter, all-oral treatment regimens for DR-TB[6] and is included on the WHO's Essential Medicines List[7].

With the use of safer, shorter, more efficacious multi-drug regimens for MDR-TB, pre-existing drug resistance to our MDR-TB medicine has thus far remained low. As with all antimicrobial agents, however, there is the potential for drug resistance to emerge. It is therefore critically important to take proactive steps to safeguard its long-term effectiveness. That's why Johnson & Johnson is working on two interrelated priorities: **responsibly stewarding TB medicines and advancing the next generation of innovation.**

What is antibiotic resistance?

Antibiotic resistance occurs when bacteria change in a way that allows them to continue surviving and growing even in the presence of antibiotics designed to stop or kill them. The issue of resistance becomes a serious public health problem when commonly used treatments with good efficacy and safety profiles lose their effectiveness. In TB treatment, different levels of drug resistance have been documented with varying levels of impact on treatment outcomes depending on how many TB medicines are affected[1].

A report from the Economist Intelligence Unit (EIU), made possible with support from Johnson & Johnson, estimated that DR-TB deaths in a single year could cost the global economy US$17.8 billion in future GDP loss and an additional US$3 billion due to work absences[4].

Stewardship

Antimicrobial stewardship efforts are crucial to ensuring that antibiotics are used safely and correctly and, ultimately, to protect their long-term effectiveness. These include a coherent set of actions promoting responsible stewardship of antibiotics at the individual, national and global levels across human health, animal health and the environment. Johnson & Johnson is undertaking a range of stewardship activities, including:

- **Medical Education:** Johnson & Johnson is ensuring appropriate clinical use of our MDR-TB medicine through medical education activities and the dissemination of relevant resources to physicians who request information about our products.
- **Safety Monitoring and Management:** A rigorous pharmacovigilance framework (referred to as active TB drug safety monitoring and management, or aDSM) is in place to track, document and analyze safety data related to our products, including our MDR-TB medicine, that we receive from around the world.
- **Antibiotic Resistance Testing and Surveillance:** Johnson & Johnson supports efforts in high-burden countries to help improve diagnostic capacity, including drug sensitivity testing, to ensure that patients are put on well-designed drug regimens to maximize their chances of treatment success and protect against the development of resistance. Further, we proactively monitor for emerging resistance by participating in antibiotic resistance surveillance programs in collaboration with WHO-recognized reference laboratories and National TB Programs.
- **Supply Continuity:** As part of our 10-year initiative to help end TB, we are continuing to ensure supply security and stability of our MDR-TB medicine by facilitating global access to more than 158 low- and middle-income countries, representing 99% of the global MDR-TB burden.

Spotlight on: Medical Education

For more than eight years, Johnson & Johnson has supported the training and education of more than 240,000 healthcare providers through global, regional and national medical education events on the appropriate management of MDR-TB in adults and children based on current international guidelines. These have taken place in key high-burden countries and regions, including India, Southeast Asia, China and South Africa, in collaboration with local governments, National TB Programs, local academic institutions and recognized training organizations.

Spotlight on: Surveillance

Johnson & Johnson proactively monitors and shares all new and emerging data on susceptibility of our drug, including through initiatives like the Antimicrobial Resistance Register, a groundbreaking data sharing initiative from Vivli with contributions from the pharmaceutical and biotech industries. This includes sharing data from the Drug Resistance Emergence Assessment in MDR-TB (DREAM) study in 11 countries that assessed treatment-naïve patients for baseline resistance to our medicine and other anti-TB drugs used for MDR-TB management[8].

Additionally, Johnson & Johnson has enabled free access worldwide to a dry powder formulation of our medicine to be used specifically for drug susceptibility testing (DST) via the National Institutes of Health AIDS Reagent Program and is working closely with diagnostics companies to further the development of assays for high-throughput DST platforms.

Innovation

While our MDR-TB medicine has made a positive impact, it's clear that we cannot end the TB epidemic with today's tools alone. We urgently need next-generation TB treatments for adults and children, including shorter and simpler regimens that are highly effective and well tolerated.

In addition to research in our own labs, Johnson & Johnson is driving progress and building momentum to end TB by forging and leading new global R&D partnerships with numerous organizations around the world, from early-stage to late clinical trials. These include the European Union's Innovative Health Initiative, the Bill & Melinda Gates Foundation, the National Institute for Communicable Diseases in South Africa and the London School of Hygiene & Tropical Medicine. Additionally, in July 2020, Johnson & Johnson invested $100 million as a founding member of the $1 billion AMR Action Fund, a groundbreaking industry initiative aimed at bringing 2-4 new antibiotics to patients by the end of the decade.

At Johnson & Johnson, we are doing our part to contribute to the much-needed TB innovation pipeline. Ultimately no single organization can end TB, which is why partnerships are so critical.

Our 10-year Initiative

In September 2018, Johnson & Johnson announced a comprehensive 10-year commitment to help achieve a world without TB by:

- Broadening access to our MDR-TB medicine for children and adults, while protecting its long-term effectiveness;
- Supporting global efforts to help find the 'missing millions' of people with TB who remain undiagnosed and therefore untreated; and
- Reinvesting in the development of shorter, safer and simpler TB treatments and regimens.

1. Global burden of bacterial antimicrobial resistance in 2019: a systematic analysis. The Lancet; 2016. Available at: https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(21)02724-0/fulltext. Last accessed March 2023. 2. Tackling Drug-Resistant Infections Globally: Final Report and Recommendations. The Review on Antimicrobial Resistance; 2016. Available at: https://amr-review.org/sites/default/files/160525_Final%20paper_with%20cover.pdf. Last accessed March 2023. 3. Why is it so hard to develop new antibiotics?. Wellcome; 2020. Available at: https://wellcome.org/news/why-is-it-so-hard-develop-new-antibiotics. Last accessed March 2023. 4. A call to action: It's time to end drug-resistant tuberculosis. The Economist Intelligence Unit; 2019. Availableat: https://pages.eiu.com/rs/753-RIQ-438/images/its-time-to-end-drug-resistant-tuberculosis-full-report.pdf. Last accessed March 2023. 5. Antimicrobial multidrug resistance in the era of COVID-19: a forgotten plight?. BioMed Central Journal; 2021. Available at: https://aricjournal.biomedcentral.com/articles/10.1186/s13756-021-00893-z. Last accessed March 2023. 6. WHO consolidated guidelines on tuberculosis. Module 4: treatment – drug-resistant tuberculosis treatment, 2022 update. World Health Organization; 2022. Available at: https://www.who.int/publications/i/item/9789240063129 Last accessed March 2023. 7. World Health Organization Model List of Essential Medicines. World Health Organization, 2021. Available at: https://www.who.int/publications/i/item/WHO-MHP-HPS-EML-2021.02. Last accessed March 2023. 8. Bedaquiline Drug Resistance Emergence Assessment in Multidrug-Resistant Tuberculosis (MDR-TB): a 5-Year Prospective In Vitro Surveillance Study of Bedaquiline and Other Second-Line Drug Susceptibility Testing in MDR-TB Isolates. PubMed, 2022. Available at: https://pubmed.ncbi.nlm.nih.gov/34705538/. Last accessed March 2023.