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COMMENTARY

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Isoniazid Preventive Therapy: A Key Factor in Tuberculosis Control

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Description

Tuberculosis (TB) remains one of the most significant global health challenges, affecting millions of people each year. While effective treatments are available, the rise of drug-resistant strains and the persistence of latent TB infections necessitate a multi-pronged approach to combat the disease. One crucial strategy in TB prevention and control is Isoniazid Preventive Therapy (IPT). IPT is a cost-effective and potent intervention that helps reduce the risk of developing active TB in individuals with latent TB infection.

History of isoniazid preventive therapy

Isoniazid, an antimycobacterial agent, was discovered in the early 1950s as a potent medication to treat active tuberculosis. Soon after its introduction, researchers recognized its potential in preventing TB in individuals with latent infections. The concept of using IPT emerged in the 1960s, and by the 1980s, clinical trials provided compelling evidence of its effectiveness in preventing the progression of latent TB to active disease. The World Health Organization (WHO) subsequently endorsed IPT as a key strategy to control TB in high-burden countries.

Mechanism of action: Isoniazid functions by inhibiting the synthesis of mycolic acids in the cell wall of *Mycobacterium tuberculosis*, the bacterium responsible for causing TB. Mycolic acids are essential components of the bacterial cell wall, and their inhibition weakens the protective barrier of the bacterium, rendering it more susceptible to immune responses and, consequently, reducing the risk of active TB development. IPT's mechanism is particularly valuable in individuals with LTBI, as it targets the latent bacteria before they have the opportunity to trigger active disease.

Effectiveness of isoniazid preventive therapy: Multiple clinical trials and real-world studies have demonstrated the effectiveness of Isoniazid Preventive Therapy in reducing the incidence of active TB. When administered appropriately, IPT can lower the risk of TB reactivation by up to 90%. Moreover, IPT has proven to be especially beneficial in specific high-risk populations, such as people living with HIV, where the risk of TB reactivation is substantially higher. By preventing TB in these vulnerable groups, IPT plays a vital role in reducing TB-related morbidity and mortality.

Challenges in implementing isoniazid preventive therapy

While Isoniazid Preventive Therapy holds significant promise, its widespread implementation faces several challenges:

Latent TB diagnosis: Identifying individuals with latent TB infection remains a primary hurdle. Conventional tuberculin skin tests and interferon-gamma release assays (IGRAs) are not always accessible or affordable in resource-limited settings.

Drug resistance: As with any antimicrobial agent, there is a risk of developing drug-resistant strains when IPT is used improperly or inconsistently. It underscores the importance of accurate diagnosis, proper prescription, and patient adherence.

Duration of treatment: Isoniazid is typically administered as a daily therapy for six to nine months. Maintaining patient adherence for such an extended period can be challenging, leading to incomplete treatment and reduced effectiveness.

Adverse effects: While Isoniazid is generally well-tolerated, some individuals may experience

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adverse effects, including liver toxicity. Regular monitoring is necessary to detect and manage any potential side effects.

Program implementation: Integrating IPT into existing healthcare programs requires coordination between TB control programs and other healthcare services, such as HIV care. This can be complex and may vary depending on the local healthcare infrastructure.

To address these challenges and maximize the impact of Isoniazid Preventive Therapy, several strategies can be employed:

Improved diagnostic tools: Investing in affordable and accurate diagnostics for latent TB infection can enhance the identification of individuals who would benefit from IPT.

Shorter treatment regimens: Research into shorter, well-tolerated regimens could improve patient adherence and, consequently, the overall effectiveness of IPT.

Patient education and adherence support: Educating patients about the importance of completing their IPT regimen and providing adherence support can enhance treatment completion rates.

Healthcare system integration: Coordinating TB control programs with other healthcare services, such as HIV care and maternal and child health programs, can facilitate the implementation of IPT in high-risk populations.

Research and innovation: Continued research into new and improved preventive therapies, as well as better understanding of TB pathogenesis, will aid in developing more effective strategies to combat the disease.

Isoniazid Preventive Therapy has emerged as a cornerstone in tuberculosis control, offering a potent and cost-effective means to prevent the progression of latent TB to active disease. Its effectiveness, especially in high-risk populations, cannot be understated. However, successful implementation relies on addressing challenges related to diagnosis, adherence, and healthcare system integration. By investing in innovative research, bolstering healthcare infrastructure, and promoting patient education and support, IPT can play a pivotal role in reducing the global burden of tuberculosis and moving towards the ultimate goal of TB eradication.