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Home-grown vaccine demonstrates 100% protection against tuberculosis

by Bertie Jacobs (<https://news.nwu.ac.za/news-team#Bertie>)

In an intriguing joint announcement, the Walter Sisulu and North-West universities unveiled the astounding results of their preclinical trials for a groundbreaking combination vaccine against tuberculosis (TB) and Covid-19. The universities reported an unprecedented 100% protection in vaccinated animals – a significant step forwards in the unrelenting battle against tuberculosis, one of the world's most devastating diseases.

"Tuberculosis is not just a local problem. It is the leading cause of death in South Africa and many other countries," explained Prof Anne Grobler, a global biotech and pharmaceutical expert and project manager of the South African vaccine platform for infectious diseases (SAVAC) initiative for both universities, who successfully commercialised another home-grown technology in bio-agriculture on an international scale. "To imagine we might be on the brink of defeating this insidious disease is truly electrifying."

The Walter Sisulu University Medical School, whose research is informed by essential national health priorities, collaborated with the North-West University, a trailblazer in drug development and research, on this project. Initiated 18 months ago, their collaborative research was also bolstered by a CHIETA (the Chemical Industries Education & Training Authority) grant.

At the forefront of this multi-purpose vaccine development is the esteemed Prof Markus Depfenhart, the inventor and driving force behind the concept and development of the vaccine. Last year Prof Depfenhart, who holds extraordinary appointments as professor at both the universities, was honoured with a Walter Sisulu University honorary doctorate for his pioneering work in vaccine and gene therapy in Africa.

Reflecting on the revolutionary nature of this vaccine, Prof Depfenhart shared: "DNA vaccines have incredible potential due to their stability and adaptability. By marrying their strengths with the high efficacy of mRNA vaccines, we are breaking new ground. This union brings out the best of both worlds and could herald a pivotal shift, especially for regions like Africa."

The results from three different immunogenicity studies in two animal models led to, and justified the performance of an effectivity study in an animal model that mimics tuberculosis in humans. The key deliverable of the study, which was carried out at the high-security Biosafety Laboratory (BSL3) of the preclinical imaging facility of the South African Nuclear Medicine Research Infrastructure (SANuMeRI) housed at NECSA (South African Nuclear Energy Corporation), was survival. Indeed, the study showcased a 100% protection rate for the vaccinated animal subjects, a feat not previously described in literature. Prof Depfenhart commended the NECSA team, declaring: "The dedication and sacrifices made by the NECSA team during this intense study period were invaluable."

A standout feature of this vaccine is its unique ability to mirror bacterial protein production, potentially bypassing certain human protein modifications. This ensures that the immune system is introduced to the most authentic version of the antigen, essentially acquainting it with the "true enemy". When confronted with a real infection, the immune system can then respond more swiftly and effectively. This novel approach, developed by Prof Depfenhart, could be groundbreaking and may well explain the vaccine's notable efficacy against TB.

With such remarkable results, the next step is to move swiftly into human trials. Preparations for discussions with the South African Health Products Regulatory Authority (SAHPRA) are underway to determine the requisite standards and protocols.

Prof Rushiella Songca, the vice-chancellor and principal of the Walter Sisulu University, encapsulated the prevailing optimism: "We are not merely talking about another vaccine; this is a beacon of hope. Given TB's unyielding onslaught over the years, standing on the precipice of a tangible solution is epoch-making. Through this venture, our scientific community is signalling that no challenge is insurmountable."

Elaborating on the collaborative spirit of the initiative, Prof Awie Kotze, executive dean of Health Sciences at the North-West University (NWU), extended his profound gratitude to Prof Depfenhart, Prof Grobler and the entire collaborative team. "Prof Depfenhart's creative impact and innovative drive have been the backbone of this project. His generosity in donating an exclusive worldwide licence for this vaccine, specifically tailored for the African populace, reaffirms his reputation as a leading figure in medical innovation. His influence on this endeavour and beyond is immeasurable."

Prof Jeffrey Mphahlele, deputy vice-chancellor for research and innovation at the NWU, could not contain his pride and excitement. "The diligence, fervour and ingenuity of this team have been nothing short of astonishing. Having managed to keep such a fast-moving initiative under the radar and then to unveil results of this magnitude is a testament to our team's prowess.

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