

NEWS RELEASE

PEP talk from plants - The hunt for a safer, effective and more economical rabies treatment



Researchers have tested antibodies generated in tobacco plants that can neutralise certain strains of the rabies virus. Source: Shutterstock.

PRETORIA - Rabies predominantly affects marginalised populations. Although effective human vaccines and immunoglobulins exist, the immunoglobulins are often inaccessible or unaffordable to those in need. An international drive to develop alternative post-exposure prophylaxis (PEP) biological alternatives, led by the World Health Organisation, is underway.

Researchers at the [Faculty of Veterinary Science](#) at the University of Pretoria (UP) have tested antibodies generated in tobacco plants that can neutralise certain strains of the rabies virus. This approach will make neutralising antibodies cheaper to produce. In addition, the antibodies are more stable, and their production is scalable.

“Rabies deaths are preventable with prompt PEP to stop the virus from reaching the central nervous system,”

[Professor Claude Sabeta](#) says. “Currently, PEP for dog bites that draw blood comprises the administration of a rabies vaccine together with rabies immunoglobulin (RIG) of either equine or human origin. Human RIG suffers from many restrictions, including limited availability, batch-to batch inconsistencies and the potential for contamination with blood-borne pathogens.”

He points out that in the developing world, RIG preparations are expensive, often in short supply and of variable efficacy.

“Therefore, we are seeking to develop a monoclonal (derived from a single cell) antibody mixture to replace RIG,” he says. “Monoclonal antibodies (mAbs) are immune system proteins that are used in targeted drug therapy and prophylaxis, and are in high demand around the world to fight diseases.”

This will have enormous impact on human health, as about 60% of human infectious diseases originate from animals (called zoonotic transmissions). Lyssaviruses are a group of animal viruses that can cause central nervous system infections in all warm-blooded mammals, including humans. Rabies is only one of the 18 viral species found in this genus and is a neglected zoonotic disease. Although generally associated with domestic dogs, in South Africa wildlife host species such as the black-backed jackals and bat-eared foxes in the Limpopo, and North West and Northern Cape provinces respectively have also been implicated. In 2015, a rabies outbreak in jackals was reported in KwaZulu-Natal.

Initial challenge and administration of the antibody cocktail on hamsters showed a protection level of up to 60%.

“The compelling need to find a less expensive and safe alternative for RIG alone is not sufficient to pave a smooth path for further development of recombinant mAb-based PEP for implementation in the clinic,” Prof Sabeta says.

The biggest barrier to reaching the market is the complicated and untried clinical development path to replace effective immunotherapies for lethal but neglected infectious diseases, such as rabies. In most countries, human trials for replacement products for these diseases are impossible due to ethical considerations.

“Since 2002, the US Food and Drug Administration has made available an alternative ‘animal rule’ pathway for development where efficacy is established in well-controlled model animal trials and safety in normal human trial pathways,” Prof Sabeta explains. “The situation in other parts of the world is more complicated and will require coordinated efforts for regulatory reform on a global level. There is no set clinical or regulatory path for this type of prophylaxis where it is needed the most, irrespective of whether it was produced from the somewhat novel plant-based platform or from the more established mammalian cell culture systems (such as Chinese hamster ovary cells). Proactive and early engagement with Asian and African regulatory authorities, such as South Africa’s Medicines Control Council, is underway to sensitise them on approval frameworks and market entry elsewhere in the world.”

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ABOUT THE UNIVERSITY OF PRETORIA

The University of Pretoria (UP) is one of the largest contact and residential universities in South Africa. Spread over seven campuses, it has nine faculties and a business school, the [Gordon Institute of Business Science](#) (GIBS). It is the only university in the country with a [Faculty of Veterinary Science](#), which is ranked the best in Africa. UP has 120 academic departments and 92 centres and institutes, accommodating more than 56 000 students and offering about 1 100 study programmes. It has the most academic staff with PhDs (70%), NRF-rated researchers (613).

The [2025 Times Higher Education \(THE\) Impact Rankings](#) placed UP 7th globally for Sustainable Development Goal (SDG) 17: Partnerships for the Goals, recognising the University's leadership in building impactful global collaborations. UP also ranked 41st in the world and 1st in Africa and South Africa for SDG 16: Peace, Justice and Strong Institutions, and maintained its position as the second-highest ranked university overall in both Africa and South Africa.

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In the [2025 QS World University Subject Rankings](#), UP is ranked in the top 100 in the world in Mineral & Mining Engineering (41), Veterinary Science (51–60), and Development Studies (51–100). Six UP subjects are ranked No. 1 in South Africa: Mechanical Engineering, Veterinary Science, Mathematics, Accounting & Finance, Business & Management Studies, and Economics & Econometrics.

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