Strategies and new technologies against viral threats

The Neyts-Laboratory of Virology, Antiviral Drug & Vaccine Research at the Rega Institute for Medical Research, part of the KU Leuven, has a long-standing expertise in the development of antiviral strategies and drugs against emerging and neglected viral infections. It also focusses on the development of novel vaccine technologies.

Lab-leader Prof. Dr. Johan Neyts

Prof. Dr. Johan Neyts teaches virology at the medical school and at the school of dentistry at the KU Leuven. He is past president of ISAR, the International Society for Antiviral Research. Prof. Neyts co-founded the KU Leuven spinoffs Okapi Sciences and AstriVax. To date, he has published more than 640 papers and delivered approximately 350 invited lectures. His laboratory has participated in, or coordinated, numerous EU-funded projects over the years. Johan Neyts is often interviewed by the general press on virus-related topics.

Development of Antiviral Strategies

Together with the Centre for Drug Design and Discovery (CD3) in Leuven, his laboratory works on developing novel antiviral strategies against several viruses or viral families for which no small molecule antiviral drugs exist yet.

© KU Leuven - Layla Aerts - © KU Leuven - Layla Aerts - Lab-leader Prof. Dr. Johan Neyts

Advances in Dengue Research

The laboratory, supported by the British Wellcome Trust, in collaboration with CD3 and later joined by Janssen Pharmaceutica, developed a highly potent pan-serotype inhibitor of the dengue virus. Findings were published in *Nature* in 2021 and 2023. In October 2023, Janssen Pharmaceutica announced promising data from a Phase 2a clinical trial of the drug JNJ-1802, demonstrating antiviral activity and safety in humans.

Broader Acting Antivirals

Prof. Neyts advocates for the development of small molecule antivirals active against entire families of viruses. This concept involves developing orally available antiviral drugs during peacetime to be ready for future epidemics or pandemics. His lab, along with CD3, is actively working towards this goal within the context of EU-funded projects.

Caps-IT: Automated High Biosafety Laboratory

© KU Leuven - Layla Aerts - © KU Leuven - Layla Aerts - Lab-leader Prof. Dr. Johan Neyts
© KU Leuven - Layla Aerts
© KU Leuven - Layla Aerts
© KU Leuven - Layla Aerts

The team designed a fully automated high biosafety laboratory-in-a-box named Caps-IT, capable of conducting antiviral tests against multiple viruses at high throughput. During the Covid-19 pandemic, the team screened over 2 million molecules for SARS-CoV2 activity, with a capacity of roughly 25,000 tests per day.

VirusBank Platform

In December 2022, the Belgian government invested 20 million euros in the VirusBank Platform in Leuven, led by Johan Neyts and Patrick Chaltin of CD3. The facility focuses on viral epidemic preparedness by developing assays, reverse genetics systems, and broader-spectrum antiviral drugs. It was officially opened in October 2023 by federal prime-minister Alexander De Croo and other officials.

Vaccine Development

Together with Prof. Kai Dallmeier, the Neyts-lab is working on innovative vaccine technologies. A significant advancement is a yellow fever vaccine that does not require a cold chain and can be produced without fertilized chicken eggs. This technology is being further developed through the KU Leuven spinoff AstriVax.

AstriVax

Founded in 2022, AstriVax raised 30 million euros in funding to advance vaccine technologies. The yellow fever vaccine serves as the first clinical development project and a vector for developing vaccines against other diseases, including rabies and chronic hepatitis B.

Neyts-Laboratory of Virology,
Antiviral Drug & Vaccine Research
Rega Institute for Medical Research
Herestraat 49 – box 1043 – B-3000 Leuven
Email: johan.neyts@kuleuven.be
www.antivirals.be / www.virusbankplatform.be
www.cd3.be / www.astrivax.com
X: @neyts_johan