



News Release

Media Contacts:

Jake Sargent
+1 732-524-1090
JSargen3@its.jnj.com

Seema Kumar
+1 908-405-1144
SKumar10@its.jnj.com

Trish Garrity
+1 202-951-0265
TGarrity@its.jnj.com

Investor Relations:

Jennifer McIntyre
+1 732-524-3922

Janssen Announces Novel Mechanism of Action that Shows Promise Against Dengue in Data Published in *Nature*

Early-stage research suggests potential to prevent and treat all dengue serotypes

With no treatments available, dengue infects up to 400 million people each year and the pace of outbreaks is increasing.¹

This research builds on Johnson & Johnson's work to advance science against emerging and entrenched global public health threats

BEERSE, BELGIUM, October 6, 2021 – The Janssen Pharmaceutical Companies of Johnson & Johnson (Janssen) announced today, in collaboration with the KU Leuven Rega Institute and the KU Leuven Centre for Drug Design and Discovery (CD3), the publication of new preclinical data in the journal *Nature* showing that an early-stage compound with a novel mechanism of action could potentially treat all serotypes of dengue fever and provide a period of protection against acquiring the dengue virus. Janssen is now moving its dengue program into clinical development.

Data from the early-stage study suggest that an antiviral compound prevents the interaction between two viral proteins (NS3 and NS4B) that play an important role in the replication process of a virus, thereby stopping the ability of the virus to reproduce. This represents an entirely novel mechanism of antiviral action. The compound showed efficacy against dengue infection in a prophylactic setting, and rapid and significant reduction in viral load at peak viremia in a therapeutic model.

¹ World Health Organization. "Dengue and severe dengue. Key facts." Last accessed August 2021.
<https://www.who.int/news-room/fact-sheets/detail/dengue-and-severe-dengue>

"This scientific breakthrough shows tremendous potential to treat and prevent all four dengue serotypes and help transform the world's fight against this significant and growing public health threat," said Paul Stoffels, M.D., Vice Chairman of the Executive Committee and Chief Scientific Officer, Johnson & Johnson. "We are hopeful that this early-stage science can ultimately translate into a meaningful difference for at risk communities. We look forward to working with our collaborators to accelerate clinical development."

Named one of the top ten² threats in 2019 by the World Health Organization, dengue is critically important to global health security as it infects up to 400 million people, sickens up to 100 million and kills thousands each year. The virus is poised to impact billions more people³ in the coming decades as the *Aedes aegypti* mosquito that carries the dengue virus spreads further from its native regions, driven by converging trends like climate change, urbanization and a growing population. An August 2021 report from the Intergovernmental Panel on Climate Change⁴ also warns that warming temperatures could potentially drive increases in the incidence of vector-borne diseases, including dengue. As the frequency of outbreaks continue to dramatically grow, as evidenced by recent surges in South Asian countries including Bangladesh and Sri Lanka⁵, the discovery of new treatment and prevention methods for dengue is greatly needed.

"As the climate continues to change and more communities are at risk, it is imperative that we advance our science to meet the needs of today and those to come," said Ruxandra Draghia-Akli, M.D., Ph.D., Global Head of Global Public Health R&D at Janssen Research & Development, LLC. "Our breakthrough work in dengue signals what is possible when collaborative science is applied at the discovery phase and channeled toward great unmet need in public health."

The Janssen dengue compound discovery program started in 2007. There are no therapeutics available to treat dengue, and research & development (R&D) has proven challenging, in part because of the existence of multiple dengue serotypes, each of which can cause reinfection and co-circulate in the same regions. In 2013, Janssen collaborated with Professor Johan Neyts and Suzanne Kaptein at the KU Leuven Rega Institute and Patrick Chaltin at Centre for Drug Design and Discovery (CD3), as well as their respective teams, to identify a compound series capable of inhibiting the virus in lab-grown cells and animals. This effort built upon four years of work on the novel antiviral inhibitor by KU Leuven Rega Institute, CD3, and the Wellcome Trust. The development of the compounds

² World Health Organization. Ten health issues who will tackle this year. Last accessed October 2021.

<https://www.who.int/news-room/spotlight/ten-threats-to-global-health-in-2019>

³ Messina, J. P., Brady, O. J., Golding, N., Kraemer, M. U. G., Wint, G. R. W., Ray, S. E., Pigott, D. M., Shearer, F. M., Johnson, K., Earl, L., Marczak, L. B., Shirude, S., Davis Weaver, N., Gilbert, M., Velayudhan, R., Jones, P., Jaenisch, T., Scott, T. W., Reiner, R. C., & Hay, S. I. (2019, June 10). The current and future global distribution and population at risk of Dengue. Nature News. Last accessed October 2021. <https://www.nature.com/articles/s41564-019-0476-8>.

⁴ IPCC, 2021: Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Masson-Delmotte, V., P. Zhai, A. Pirani, S.L. Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M.I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J.B.R. Matthews, T.K. Maycock, T. Waterfield, O. Yelekçi, R. Yu, and B. Zhou (eds.)]. Cambridge University Press. In Press.

⁵ Wipulasena, A., & Hasnat, S. (2021, August 10). A surge in dengue cases adds to the hospital burden in Covid-racked South Asia. The New York Times. Last accessed October 2021.

<https://www.nytimes.com/2021/08/10/world/a-surge-in-dengue-cases-adds-to-the-hospital-burden-in-covid-racked-south-asia.html>.

was accelerated through the expertise and collaboration of all partners. Janssen Pharmaceutica, N.V. licensed the compound series in 2015, and is continuing to advance the compound into clinical development.

Johnson & Johnson's Commitment to Neglected Tropical Diseases (NTDs) and Pandemic Preparedness

Johnson & Johnson is one of the few innovative healthcare companies in the world that is actively advancing science across multiple disease areas with the aim of strengthening global public health. This includes R&D efforts aimed at addressing pandemic threats including coronaviruses (including SARS-CoV-2), filoviruses (including Ebola) and flaviviruses (including dengue).

Janssen's work against dengue is just one part of a larger commitment to address the burden of NTDs, a group of about 20 communicable diseases that cause debilitating conditions and affect more than 1.7 billion people in 149 countries around the world.

Since 2006, Johnson & Johnson has donated more than 1.7 billion doses of its medicine to treat intestinal worms and is working with partners to identify sustainable solutions to combat NTDs over the longer term. These initiatives include improving diagnostics and supporting the development of national monitoring and evaluation frameworks to allow for better data collection, more informed decision-making, and ultimately, targeted therapeutic interventions that have the potential to control NTDs in endemic countries. Johnson & Johnson is also investing in R&D for other NTDS, including snakebite, Chagas disease and leprosy.

Janssen thanks its strategic partners in the research and development of its dengue compound, including the KU Leuven Rega Institute, the KU Leuven Centre for Drug Design and Discovery (CD3), the Department of Infectious Diseases at Heidelberg University, the German Center for Infection Research, Unité des Virus Émergents, the Global Virus Network (GVN), Wellcome Trust and VLAIO.

###

About the Janssen Pharmaceutical Companies of Johnson & Johnson

At Janssen, we're creating a future where disease is a thing of the past. We're the Pharmaceutical Companies of Johnson & Johnson, working tirelessly to make that future a reality for patients everywhere by fighting sickness with science, improving access with ingenuity and healing hopelessness with heart. We focus on areas of medicine where we can make the biggest difference: Cardiovascular & Metabolism, Immunology, Infectious Diseases & Vaccines, Neuroscience, Oncology and Pulmonary Hypertension.

Learn more at www.janssen.com. Follow us at [@JanssenUS](https://twitter.com/JanssenUS) and [@JanssenGlobal](https://twitter.com/JanssenGlobal). Janssen Research & Development, LLC is part of the Janssen Pharmaceutical Companies of Johnson & Johnson.

About Johnson & Johnson

At Johnson & Johnson, we believe good health is the foundation of vibrant lives, thriving communities and forward progress. That's why for more than 130 years, we have aimed to keep people well at every age and every stage of life. Today, as the world's largest and most broadly-based healthcare company, we are committed to using our reach and size for good. We strive to improve access and affordability, create healthier communities, and put a

healthy mind, body and environment within reach of everyone, everywhere. We are blending our heart, science and ingenuity to profoundly change the trajectory of health for humanity. Learn more at www.jnj.com. Follow us at [@JNJNews](https://twitter.com/JNJNews).

Cautions Concerning Forward-Looking Statements

This press release contains "forward-looking statements" as defined in the Private Securities Litigation Reform Act of 1995 regarding dengue fever, flavivirus and neglected tropical diseases. The reader is cautioned not to rely on these forward-looking statements. These statements are based on current expectations of future events. If underlying assumptions prove inaccurate or known or unknown risks or uncertainties materialize, actual results could vary materially from the expectations and projections of the Janssen Pharmaceutical Companies, and/or Johnson & Johnson. Risks and uncertainties include, but are not limited to: challenges and uncertainties inherent in product research and development, including the uncertainty of clinical success and of obtaining regulatory approvals; uncertainty of commercial success; manufacturing difficulties and delays; competition, including technological advances, new products and patents attained by competitors; challenges to patents; product efficacy or safety concerns resulting in product recalls or regulatory action; changes in behavior and spending patterns of purchasers of health care products and services; changes to applicable laws and regulations, including global health care reforms; and trends toward health care cost containment. A further list and descriptions of these risks, uncertainties and other factors can be found in Johnson & Johnson's Annual Report on Form 10-K for the fiscal year ended January 3, 2021, including in the sections captioned "Cautionary Note Regarding Forward-Looking Statements" and "Item 1A. Risk Factors," and in the company's most recently filed Quarterly Report on Form 10-Q, and the company's subsequent filings with the Securities and Exchange Commission. Copies of these filings are available online at www.sec.gov, www.jnj.com or on request from Johnson & Johnson. None of the Janssen Pharmaceutical Companies nor Johnson & Johnson undertakes to update any forward-looking statement as a result of new information or future events or developments.