

Press Release

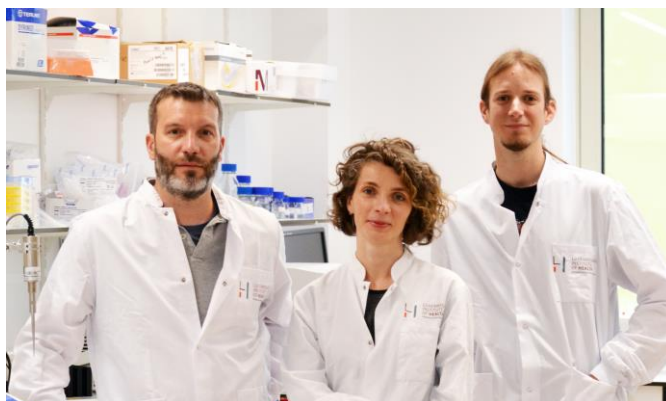
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Renewed hope for treatment of pain and depression

LIH researchers discover a new opioid receptor and develop a new molecule with painkilling effects, holding great promise for the development of alternative therapeutic strategies.

Dr Andy Chevigné, Head of Immuno-Pharmacology and Interactomics at the Department of Infection and Immunity of the Luxembourg Institute of Health (LIH), together with his team, developed a molecule that enhances the natural painkilling and antidepressant properties of molecules naturally produced in the brain, known as “opioid peptides”. These play a key role in mediating pain relief and emotions, such as euphoria, anxiety, stress and depression. The revolutionary molecule developed by the Luxembourgish researchers – baptised LIH383 – carries important implications for the development of a novel class of drugs for acute and chronic pain, depression but also for brain cancer treatment. These findings were published on June 19th in the prestigious international journal ‘Nature Communications’.

Opioid peptides are small proteins that influence a variety of feelings and processes, from motivation, euphoria, and affection, to stress and pain responses. They exert their natural analgesic and antidepressant functions by interacting with four specific receptors (“molecular switches”) located on the surface of brain cells. Synthetic opioid prescription drugs commonly used to treat severe pain — including morphine, oxycodone and fentanyl — work by targeting and activating these receptors. Despite their efficacy, these painkillers are frequently associated with several



From left to right: Dr Andy Chevigné, Dr Martyna Szpakowska and Max Meyrath

side effects, such as dependence and breathing disorders. Therefore, there is an urgent need to find new drugs with different mechanisms of action and reduced complications to relieve pain, particularly given the current public health crisis, known as the “opioid crisis”, linked to the growing abuse of and addiction to synthetic opioids.

In this context, the LIH research team led by Dr Chevigné developed a novel molecule – which they called LIH383 – that has the overall effect of increasing the availability and use of the opioids naturally secreted by the brain. These results open up alternative options for the treatment of chronic pain, stress, anxiety and depression, but also for cancer therapy. Indeed, the scientists believe this molecule could also help slow down tumour growth and metastasis development in brain cancer, which would lead to better prognosis for patients.

“We expect LIH383 to act as a precursor for the development of a new class of drugs against pain and depression, thus offering an innovative and original therapeutic strategy to tackle the opioid crisis”, underline the two first co-authors of this study Max Meyrath and Dr Martyna Szpakowska.

“This is a glaring example of the way fundamental research can be translated into concrete applications with tangible benefits for patients, leading to improved clinical outcomes”, states Prof Markus Ollert, Director of the LIH Department of Infection and Immunity and co-author of the study. “The success of our work was only made possible by the generous and unwavering support of the Luxembourg National Research Fund, the Ministry of Higher Education and Research, as well as the charitable initiative ‘Télévie’”, he concludes.

Funding and research teams

This study was supported by grants from the Ministry of Higher Education and Research (MESR), the Luxembourg National Research Fund (Fonds National de la Recherche – FNR) and Fonds de la Recherche Scientifique - FNRS-Télévie. M. Meyrath and M. Merz are Luxembourg National Research Fund PhD fellows. M. Ollert received support from the Luxembourg National Research Fund and is coordinator of the FNR-funded PhD Programme NEXTIMMUNE. J. Ohnmacht and R. Krüger were supported by the Luxembourg National Research Fund (MaMaSyn and PEARL) and the Pelican Foundation. T. Benkel and E. Kostenis were funded by the German Research Foundation (Deutsche Forschungsgemeinschaft - DFG).

The study was performed in close collaboration with national and international partners, and involved LIH’s Department of Infection and Immunity, LIH’s Transversal Translational Medicine unit, the Luxembourg Centre for Systems Biomedicine (LCSB) at the University of Luxembourg, the Department of Life Sciences and Medicine of the University of Luxembourg, the Molecular, Cellular and Pharmacobiology Section of the Institute of Pharmaceutical Biology of the University of Bonn (Germany), the Neurophysiology Unit of the University of Liège (Belgium), the Research Training Group of the University of Bonn (Germany) and the Department of Dermatology and Allergy of the Odense Research Center for Anaphylaxis (ORCA) at the University of Southern Denmark (Denmark).

About the Luxembourg Institute of Health: Research dedicated to life

The Luxembourg Institute of Health (LIH) is a public research organization at the forefront of biomedical sciences. With its strong expertise in population health, oncology, infection and immunity as well as storage and handling of biological samples, its research activities impact on people’s health. At LIH, devoted scientists investigate disease mechanisms to develop new diagnostics, innovative therapies and effective tools to implement personalized medicine.

About the Department of Infection and Immunity

LIH’s Department of Infection and Immunity is a basic clinical-translational research entity aiming at understanding the complex mechanisms of infectious and inflammatory disease processes to enable new ways to diagnose, prevent and cure human diseases. Building on a highly interdisciplinary research environment, the research strategy of the Department of Infection and Immunity focuses on experimental discovery and validation, bridging to clinical application and technology development to address major unsolved medical needs in the areas of immune-mediated inflammation (such as in allergy, asthma, autoimmunity), cancer and infectious diseases (COVID-19, AIDS, measles and rubella virus infection, amongst others).

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