The ULiège Laboratory of Medical Chemistry team currently comprises 8 researchers (PhD students and post-docs) from China, Ukraine, France, Morocco and Belgium. It is directed by Prof. Alain Chariot who also supervised PhD thesis of some former students who since established their own laboratories.

The ULiege Laboratory of Medical Chemistry is funded by the WELBIO (now the WEL Research Institute), the FNRS, TELEVIE and the Belgian Foundation against Cancer. It is also supported by fundings from both the University of Liege and the Leon Fredericq Foundation (Faculty of Medicine). All this financial support, which reaches more than half a million euros a year, helps to cover researchers' salaries as well as both operating and equipment costs of the laboratory.



The ULiège Laboratory of Medical Chemistry team in May 2025. © Medical Chemistry Laboratory

Background and expertise

The Medical Chemistry and Medical Oncology Laboratory was run by Profs Jacques Gielen and Vincent Bours with Dr Marie-Paule Merville until 2004. Following Jacques Gielen's sudden death and the creation of the GIGA, the team moved to a new tower. Since 2007, Prof. Chariot has been in charge of the GIGA's Medical Chemistry Laboratory.

The laboratory has developed expertise in the dissection of molecular and cellular mechanisms underlying tumour development, primarily in the intestine. To do this, the team combines multiple experimental approaches, including murine models that mimic tumour development in Homo Sapiens as closely as possible. Its researchers are also interested in the molecular mechanisms through which patients develop resistance to anti-cancer treatments. Finally, they are also generating ex-vivo 'mini-guts' which they use as experimental models to better understand how intestinal epithelial cells differentiate from stem cells.

Main areas of research

Most of the laboratory's work focuses on gaining a better understanding of tumour development in the intestine. Its researchers are identifying new players involved in cancer and determining to what extent these players could be defined as new therapeutic targets. More specifically, they are looking at candidates that control the production of proteins in cancer cells, enabling them to proliferate more, survive longer and, in some cases, become invasive and ultimately generate metastasis. They are also studying proteins that are essential to the immune response to infections, bearing in mind that these same proteins can contribute to tumour development when constitutively active.



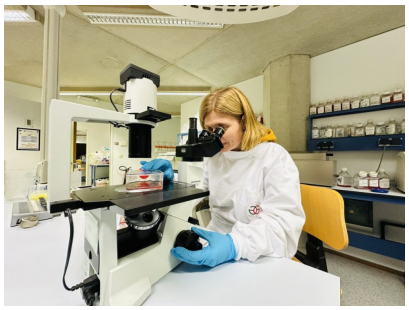
Prof. Alain Chariot, in charge of the GIGA's Medical Chemistry Laboratory. © Medical Chemistry Laboratory

Current research projects

One project in the Medical Chemistry laboratory explores the role of Elp3 in cancer. This candidate regulates the production of proteins from RNAs and has been shown to play an essential role in the development of intestinal tumours. The researchers are now exploring the extent to which Elp3 is also involved in the development of liver tumours.

More recently, the laboratory's researchers have also been looking at the role of Elp3 in the differentiation of adipocytes, the cells that store fat. It turns out that Elp3 is also involved in this process. We are all aware of the link between obesity and cancer, and taking an interest in Elp3 also enables researchers to better understand why being overweight is a risk factor in tumour development. Elp3 is part of a large family of enzymes that chemically modify some RNAs: the Medical Chemistry laboratory is

starting to address the roles of other members in cancer as well.



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The laboratory's researchers also got interested in new actors involved in cancer metabolism and are currently exploring whether and how they promote tumor development in the intestine using genetically-modified mouse models of cancer.

Projects funded by the WEL Research Institute

These projects focus on 'translational reprogramming' occuring in cancer cells, i.e. the way these cancer cells express the right cocktail of proteins to ensure tumour development. Beside Elp3, researchers in the Medical Chemistry laboratory are looking at another protein, Lepre-1, whose expression increases in many human tumours and which modifies collagen. Understanding how Lepre-1 regulates tumour development is a project currently supported by the WEL Research Institute.



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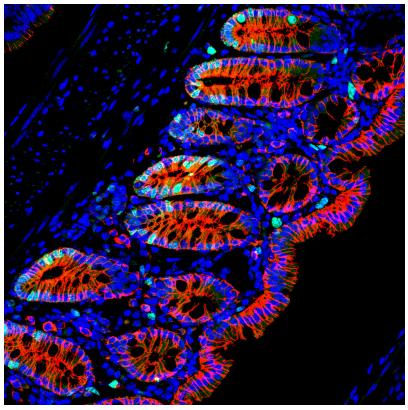
Recent publications

The latest publication from the Medical Chemistry laboratory focuses on elucidating the role of Elp3 in intestinal tuft cell differentiation. These rare cells are essential for the immune response triggered by parasitic infections in the intestine. Researchers demonstrated that Elp3 is not only important for tumour development in the intestine,

but is also essential for the immune response against intestinal parasites by ensuring proper production of tuft cells.

Another publication focused on elucidating mechanisms by which oestrogens induce the proliferation of mammary epithelial cells and contribute to the development of breast tumours. The team identified a protein, COP1, as a new player required for the proliferation of mammary epithelial cells. Researchers have also shown that this same COP1 protein can also limit the invasiveness of cancer cells. COP1 therefore has a dual role: it promotes breast cancer cell proliferation but limits their invasiveness.

The laboratory recently published a study in which a new mouse model of intestinal cancer is described. The microbiota (i.e. the bacterial signature found in the colon of these mice) is very similar to the signature found in patients suffering from colon cancer. Following studies will be dedicated to the identification of bacterial strains and their products actively involved in tumor development.

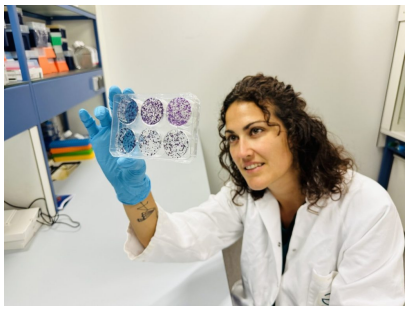


E-Cadherin and Ki67 stainings in WT mice ; © Laboratory of Medical Chemistry

Research collaborations in Belgium and abroad

The Medical Chemistry laboratory has many collaborations within the University of Liege with its expert colleagues in Immunology (B. Dewals, C. Desmet) and Neurosciences (L. Nguyen) and of course in Cancerology (P. Close, A. Blomme, F. Rapino, A. Noel). The team also maintains close links with its clinical/research colleagues at Liege University Hospital (A. De Roover, P. Delvenne and others soon). The Medical Chemistry laboratory also collaborates with the University of Ghent and the VIB (G. van Loo, L. Vereecke), with the ULB (F. Fuks) and the UCLouvain (P. Cani). Its researchers still have very close contacts with certain colleagues at the KUL (J-C. Marine, for example). Internationally, the Medical Chemistry laboratory collaborates with the University Hospital of Cologne (R. Buettner) and with the University of Luxembourg (E. Letellier). Finally, it maintains close contacts with former doctoral students who have now set up their laboratories abroad (P.

Viatour in Philadelphia and M. Bentires-Alj in Basel).



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A twofold challenge

Researchers in the Medical Chemistry Laboratory are currently faced with two major research challenges: firstly, to gain a better understanding of how many proteins with little-known biological functions contribute to tumour development. They also want to contribute to a better understanding of resistance to targeted therapies. Why do patients develop this resistance? How can they be circumvented? What therapeutic combinations should be proposed to ensure prolonged tumour regression? These are all crucial questions that will improve patient well-being.

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