

## Doctor Walter Fiers

*Professor Emeritus University of Ghent*

*Present status: free-lance Scientific Collaborator*

Walter Fiers was born in Ieper, Belgium in 1931. After obtaining a degree of Engineer for Chemistry and Agricultural Industries at the University of Ghent (1954), he started his research career as an enzymologist in the laboratory of Laurent Vandendriessche in Ghent. He then worked in Copenhagen before obtaining a fellowship from the Rockefeller Foundation and joining molecular biologist Bob Sinsheimer's group at the California Institute of Technology (CalTech) as a post-doc in 1960.



In Caltech, Dr. Fiers was exposed to the new science of Molecular Biology and began studying viral DNA. He demonstrated the physical, covalently closed circularity of Bacteriophage PhiX-174 genomic DNA. In 1962, Dr. Fiers moved to Madison, Wisconsin, to work in the laboratory of future Nobel laureate, Gobind Khorana.

At the end of 1962, Dr. Fiers set up the Laboratory of Molecular Biology at the University of Ghent. His research involved Bacteriophage MS2; he was the first to establish the complete nucleotide sequence of a gene (1972) and of a viral genome (1976).

This research led to his participation in the development of a new discipline that later evolved into "recombinant DNA technology." This was possible as, on the one hand, he was familiar with the manipulation of genetic material and, on the other hand, an understanding had been reached as to how genetic information is expressed. The development of totally new procedures and knowledge led to the ability to clone almost any gene and to express these efficiently in bacteria or in other heterologous hosts.

This approach allowed Dr. Fiers and his colleagues in 1980 to clone and express the gene coding for human interferon-beta and, later, of interleukin-2, interferon-gamma and TNF (Tumour Necrosis Factor). These genes were also expressed efficiently, leading to production in large amounts, which could then be used for basic studies as well as for clinical testing. In fact, the first clinical trials with interferon-gamma were carried out by Biogen Inc. with material produced by means of Dr. Fiers' clone. Interferon-beta, also cloned and expressed under contract with Biogen, was later successfully developed as a treatment for multiple sclerosis.

Over the years, the Laboratory of Molecular Biology of the University of Ghent has grown to the size of about 160 collaborators. In 1997 Fiers retired and became Professor Emeritus, and the following year he retired from his position as director of the Laboratory. However, he has remained scientifically active, more particularly by directing the influenza vaccine project. In 1999, he published a paper in Nature Medicine on a universal vaccine against human influenza A based on the external domain of the conserved protein M2. He is now a partner of an EU-funded Influenza Vaccine project.

## Doctor Xavier Saelens

*Group Leader of the Molecular Virology Unit at Ghent University*

Dr. Xavier Saelens, born in 1965, obtained a Bachelor's degree in Biology from Ghent University in 1985, where he later obtained a Master's degree in Biotechnology and a PhD in Biotechnology. He is currently a Lecturer in Virology and Group Leader of the Molecular Virology Unit at Ghent University.



His current work surrounds the development and characterisation of novel influenza A and B vaccines. A major part of the research is focused on the characterisation and optimisation of an M2e-based vaccine. In particular the mechanism of action and the performance of M2e-based vaccines in animal models other than the mouse are unresolved questions that remain to be addressed.

This two-year cooperative research project, called Universal Vaccine, began in October 2005 and has received €1.2 million in funding under the Sixth Framework Programme of the European Commission. The unique combination of the three SMEs for the rational design of a mucosal influenza vaccine is unprecedented in European vaccine research. If the universal vaccine proves successful in clinical trials, it will not only help to diminish the social and economic costs of influenza, but also secure the growth and development of the European vaccine industry in the global market.

Dr. Saelens considers the Universal Vaccine program a key element in the battle against human/avian flu for one simple reason. Whereas other vaccines work by stimulating the body's immunity against the haemagglutinin (H) and neuraminidase (N) proteins on the virus' surface, the Universal Vaccine focuses on the M2 protein in the virus' outer coat. And while the H and N proteins are prone to mutation, with few exceptions, no change in the amino acid sequence of the M2 protein has been reported since influenza virus was first isolated in 1933. If this protein could stimulate an adequate immune response it might be possible to develop a broad-spectrum vaccine against all influenza A subtypes.

Dr. Saelens is also excited at the prospect of helping to produce a vaccine that can be administered nasally. By stimulating the immune system at the site of influenza virus entry into the host, nasal vaccination may help to induce more effective and long lasting immunity in recipients. Furthermore, needle-free nasal sprays are safer and easier to administer, reduce the risk of contamination – and are far less likely to deter people from participating in vaccination programmes.

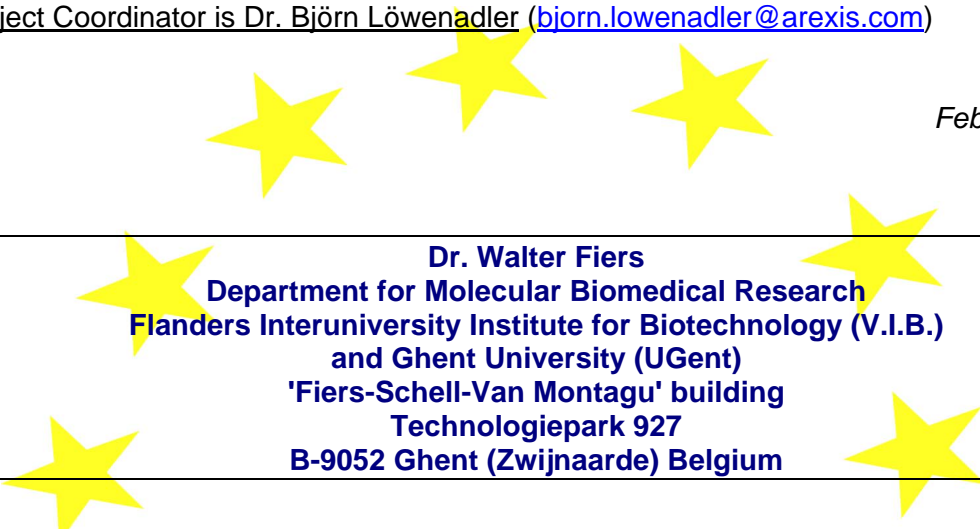
### **UNIVERSAL VACCINE: Designing a nasally administered universal influenza vaccine**

One of the biggest challenges concerning influenza vaccination is trying to keep up with the virus' mutational variation. The currently approved vaccines work by stimulating the body's immunity against the haemagglutinin and neuraminidase proteins on the virus' surface. As these proteins are prone to mutation, vaccines only induce immunity against specific subtypes of the virus.

However, the influenza virus has a third protein in its outer coat, M2 and the extracellular domain of this protein, M2e, has been remarkably conserved in the amino acid sequence since human influenza virus was first isolated in 1933. This project is therefore working towards the possibility of developing a universal vaccine based around the M2e domain. If clinical trials prove successful, the vaccine will not only help to diminish the social and economic costs of influenza, but also secure the future growth of the European vaccine industry.

Project Coordinator is Dr. Björn Löwenadler ([bjorn.lowenadler@arexis.com](mailto:bjorn.lowenadler@arexis.com))

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**Dr. Walter Fiers**  
**Department for Molecular Biomedical Research**  
**Flanders Interuniversity Institute for Biotechnology (V.I.B.)**  
**and Ghent University (UGent)**  
**'Fiers-Schell-Van Montagu' building**  
**Technologiepark 927**  
**B-9052 Ghent (Zwijnaarde) Belgium**

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**Dr. Xavier Saelens**  
**Group leader Molecular Virology unit**  
**Department for Molecular Biomedical Research**  
**Flanders Interuniversity Institute for Biotechnology (V.I.B.)**  
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