The STEMBANCC Project

The objective of the European project Stembancc, which started in October 2012, is to develop a stem cell bank using material from 500 patients with clearly diagnosed pathologies. Pr. Frédéric Bois, Chair of Mathematical Modelling for Systemic Toxicology at UTC and his team are contributing their modelling skills.

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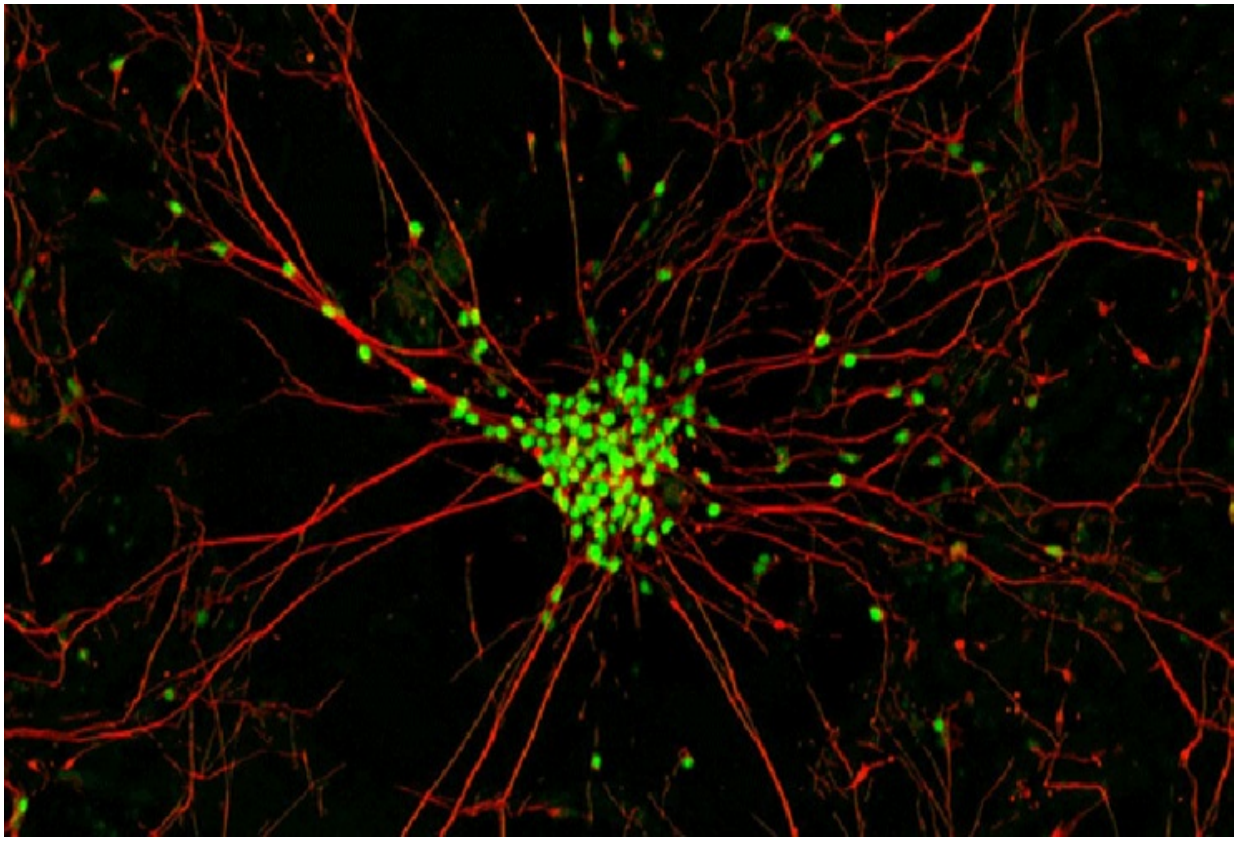

"Today, in order to test the effects of new medicinal drugs on persons suffering from certain well-identified pathologies (heart

disease, kidney disorders ...), we can either use cells from the patients' biopsy material, or laboratory grown strains", explains Professor Bois. "The dual problem is that biopsies only provide a limited number of cells and laboratory strains are in fact cancer cells if they are to replicate indefinitely. For this reason, they differ from cells taken from the patient".

The STEMBANCC Project

The European Union decided to launch the STEMBANCC project to find a solution to the problem outlined above. The project leaders are at Oxford University (UK). Project duration is 5 years, financed by the European Commission (EC), in association with the Innovative Medicines Initiative**, which is a technological platform grouping together a number of international pharmaceutical industries. Their objective is to develop a library bank of induced human pluripotent stem cells sampled from 500 patients with well-known pathologies.

The patients are being recruited on a voluntary basis, throughout the EU. Patients with well-defined pathologies (of fairly frequent occurrence, such as diabetes, heart ailments, neurodegenerative illnesses, psychiatric disorders ...). The recruitment protocol follows very stringent criteria. "The skin cells or blood cells are sampled, dedifferentiated and returned to their stem cell state", explains Frédéric Bois. "These stem cells can be re-differentiated on request from the pharmaceutical laboratories to produce liver, kidney, heart or even neurone cells".

Once there is a sufficient quantity of the required differentiated cells, it will then be possible to test new medicinal drugs on them, measuring the drug's efficiency and listing possible unwanted side-effects. "The objective is to find medicinal drugs that are best adapted to patients with specific diseases, such as diabetes, heart or neurological disorders", adds Frédéric Bois. "Compared with biopsy cells or cultivated cell strains, the new population of cells examined are potentially closer to "normal" human cells. They would also have the advantage of being available in unlimited

quantities since the bank will comprise cells that can be replicated infinitely". The cell bank would also enable several laboratories to carry out identical tests for the purpose of confirming previous results obtained during analysis of the medicinal active molecules at play.

The role assigned to UTC

Prof. Bois' team is involved in developing the appropriate mathematical models, capable of analysing the toxicity levels of the medicinal drugs tested. The models aim at extrapolating results obtained with a given strain of cells under test-tube conditions to the entire body. To this end, the UTC team is collaborating closely with another team at the University of Innsbruck, Austria, working on oxidative stress in kidney cells. *"A lot of medicinal drugs induce oxidative stress and in the long run it can damage the cells"*, notes Frédéric Bois. *"It is therefore very interesting to study its effects on cells for patients suffering from kidney diseases, for example".*

Long term objectives

In the long term, the objective assigned to the project extends to controlling production of stem cells that, according to Prof Bois *"could allow us to rebuild tissue, or even a complete organ for a patient and this would eliminate any risk of transplant graft rejection"*.

More at: http://www.ineris.fr/ http://stembancc.org/

* induced pluripotent cells have the capacity to differentiate themselves into any other type of cell present in an organism (kidney cells, skin cells, neurones ...) as well as being able to replicate indefinitely in a culture milieu.**The Innovative Medicines Initiative (IMI) is part of the joint technology initiative (JTI), one of the instruments used to implement the 7th Framework Programme (FP7) for Research, Development and Demonstration. It should be noted that this programme is a joint programme between the EC and various pharmaceutical industries represented by the European Federation for Pharmaceutical Industries and Associations (EFPIA). Both parties are co-financing the programme, 50% each.