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Cédric Blanpain, Professor of Stem Cell and Developmental Biology and WELBIO investigator, Interdisciplinary Research Institute, Université Libre de Bruxelles.

In September 2004, a photograph showing a patch of hair grown from a single skin stem cell, grafted onto the back of a nude mouse, caused great excitement in the research community and beyond. It illustrated the first experimental proof of the ability of these cells to differentiate into skin, hair and oil glands.

Cédric Blanpain was one of two Rockefeller University postdoctoral research fellows who co-first authored the study, having developed a new method of isolating skin stem cells. Now head of his own lab in his native Belgium, Blanpain is investigating the role of stem cells in embryonic development, as well as the roles of adult stem cells during cancer formation.

Since his early taste of the research limelight nine years ago, Blanpain and his team have attracted international attention with a series of ground-breaking publications. These have included the discovery of new mammary gland stem cells, the cellular origins of skin cancer, and the first experimental evidence of the role of cancer stem cells in their natural environment. In February he will receive the 2012 Liliane Bettencourt Prize for Life Sciences. Here he explains his motivations and how the prize will help drive his work forward.

Q: What triggered your interest in stem cells and cancer?

After my basic medical training I specialised in internal medicine and spent a lot of time with cancer patients who could not be cured by surgery. It made me extremely sad when I realised that the most we could offer these patients was a few more years. If I had to choose one thing we could improve in medicine over the next 20 years it would be to improve the survival of cancer patients. I discovered my love of basic research during my PhD and I could see the great potential of answering some of the basic unresolved questions about stem cells. When I finished my postdoc I decided to combine my interests in stem cell biology and cancer biology.

Q: Can you tell us about the work that you are most pleased with?

Until recently it was believed there was one ultimate stem cell in the mammary gland. This was based on laboratory experiments, but no-one looked at what mammary gland cells do in their natural environment. When we did, we found

there are two separate populations of mammary stem cells. It was a paradigm shift with major implications for our understanding of the cellular origin of breast cancer.

Q: How will this help patients?

Some women with breast cancer have good chances of survival while others don't. One possible explanation is that different prognoses are linked to cancers originating from different types of stem cells. This is something we are currently investigating.

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Q: You published a paper in *Nature* this year which showed for the first time the natural role of cancer stem cells in tumour growth.

How exciting was that?

In 1997 John Dick and his group at Toronto University famously provided the first evidence that some cells within a tumour have a much greater ability to propagate than others. The suggestion was that these cancer stem cells sustain tumour growth, resist chemo and radiotherapy and are responsible for relapses. This was of course great work but it was again based on experiments which can only tell us what these cells do in those laboratory conditions. We produced the first experimental evidence for the existence of cancer stem cells in the early stages of solid tumour growth. This involved using genetic labelling so

that individual tumour cells express a reporter gene which allows us to follow them and their progeny over time in living organisms. In benign skin tumours we found that only a minority of cells persist long-term and give rise to progeny that make up a large part of the tumour. It was very exciting because we knew we had put our fingers on something extremely important.

Q: What does receiving this prize from the Bettencourt Schueller Foundation mean to you?

It's a highly prestigious international award. Those who have received it in previous years are scientists I hold in high esteem, so to receive it personally is a real delight for me.

Q: How will this prize help move your research forward?

We receive significant funds to understand the connections between stem cells and cancer, but there have been no specific grants for our work on fundamental questions concerning normal stem cell biology. We have found many things of interest to follow up on in these areas and the prize money means we can press on immediately with these exciting projects.

Q: What is the current focus of your research and what directions will it take in future?

We discovered a new type of stem cell that contributes massively to wound healing in the skin epidermis. I would like to gain a better understanding of what recruits those cells and regulates the balance between proliferation and differentiation. It would be very interesting to also understand what regulates the different types of mammary gland stem cells. I also really want to know whether the cancer stem cell mechanisms we identified in skin tumours are also present in other cancers such as breast and prostate.

Q: Do you have any advice for young scientists?

If you always follow the crowd you are unlikely to make the most cutting edge and interesting discoveries. Sometimes it is really worth taking on a new path. It might seem risky to tackle areas about which almost nothing is known, but often that kind of work is more likely to pay off than more of the same.