HORIZON2020PROJECTS

# What now?

## Is Swiss science facing the abyss?

# Introduction

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The Swiss Confederation has been a close ally of the EU for many years, sharing geographical, political, economic and cultural ties. The relationship is best symbolised through open international trading and a harmonious, transient population.

However, this cordial relationship took a severe blow in February when Swiss citizens voted in favour of reintroducing annual immigration quotas, immediately affecting the country's participation in Horizon 2020. Whilst Swiss citizens were in favour of restricting immigration, the decision directly contravenes the EU's fundamental principle of the free movement of people. A deal concerning this free movement was signed between the European Commission and Switzerland in 1999.

With no association agreement, Switzerland now falls into the category of being a third country in Horizon 2020. Due to the country's wealth, Swiss-based institutions are no longer automatically eligible for Horizon 2020 funding, and therefore must provide their own money when participating in project consortia. The Swiss National Science Foundation has launched a national temporary backup scheme to help overcome some of the lost opportunities.

Whether Switzerland will finally be able to sign an association agreement with the Commission remains to be seen. Yet the country's actions to mitigate the effects of its new Horizon 2020 status demonstrate its determination to play a leading role in European research, innovation and science. The following articles showcase key opinions from the Swiss academic community, carry the EU's response to the referendum, and compare Switzerland's Horizon 2020 participation to that of another wealthy neighbour, Israel.

## Martin Hynes
### Chief Executive
### European Science Foundation

AT the European level (and at the level of EU member states), there is now a significant emphasis being placed on innovation, and yet as the pendulum swings from practice through to basic science and back again, it is important to also take into account the other areas of politics that are coming to have an impact. Perhaps the most notable example of this is the way in which Switzerland has been 'downgraded' to a third country in the EU, after holding a referendum regarding the reintroduction of immigration controls (particularly with regard to Croatia's accession to the EU, of course).

This means that Switzerland – a country that has always excelled in ensuring a return from scientific endeavour – is no longer automatically eligible for funding through the Horizon 2020 instrument.

Switzerland is a country that has traditionally focused on not only the best science, but also the best support for interaction between science and enterprise. This is a model that is extremely interesting, perhaps even more so when it is realised that things can become very seductive when people talk about moving science spending increasingly towards technology and market activities.

However, if it is instead asked how we can encourage greater collaboration between market-facing and enterprise activities and the scientific world, then this becomes a different question entirely. As is increasingly evident, addressing the question this way is a much better approach.

# A FUNDAMENTAL PRINCIPLE

**Horizon 2020 Projects** carries the response of the European Commissioner for Research, Innovation and Science, **Máire Geoghegan-Quinn**, after Switzerland votes in favour of reintroducing immigration quotas

The European Commission defines the free movement of people as "a central pillar of our relations with Switzerland". The importance placed on this freedom was realised by the reaction of the EU following the vote by Swiss citizens in favour of reintroducing immigration quotas.

Prior to the referendum, Switzerland approved an agreement with Brussels that when Croatia became an EU member state, an amendment would need to be ratified on the free movement of people between the country and the Union. As a consequence of the public vote, the Swiss Government was unable to amend the deal and was compelled to consider the introduction of new immigration quotas.

## Freedom to move

Brussels reacted by immediately suspending negotiations with Switzerland on a possible association agreement, downgrading it to third country status. In a statement, László Andor, European Commissioner for Employment, Social Affairs and Inclusion, said the free movement of people and immigration quotas were contradictory: "It is very difficult to imagine how immigration quotas and national preference could be made compatible with the agreement on the full free movement of persons we are having with Switzerland. Quotas are contrary to the principle of free movement, and the principle of free movement is not only an essential part of the internal market, which cannot be decoupled from the other freedoms, but also at the heart of our overall relations with Switzerland."

## Brussels replies

Shortly after the referendum, Máire Geoghegan Quinn, European Commissioner for Research, Innovation and Science, was unequivocal in her response and reasoning behind the Commission's actions. In an interview with the EU policy broadcaster viEUws, she said: "A fundamental policy of the European Union is the freedom of movement of people. Anything that interferes with that we take extremely seriously.

"So now the situation in Switzerland is treated as any third country. It is not an associated country any more … for these calls and for now, they are treated as a third country. That is a huge disadvantage for them. If you look at European Research Council grants in particular, Switzerland has hosted a huge number of ERC grantees. Now, while Swiss scientists can apply, they will be hosted in a European Union institute or university."

Indeed Geoghegan-Quinn contrasted the referendum result with her previous optimism for the framework project: "I went to Switzerland to launch Horizon 2020 with the Swiss. We had a capacity-filled room of researchers, business people and all kinds

of stakeholders who came along because they found it so important for them to be involved.

"It was a huge disappointment for us, but also a huge disappointment for researchers and for the government in Switzerland when the referendum went through."

## Negotiation?

Following Geoghegan-Quinn's comments, Brussels sent an official letter to Bern, formally stating the EU's inability to renegotiate the country's bilateral agreement on the free movement of people. Catherine Ashton, the High Representative of the Union for Foreign Affairs and Security Policy, defined the freedom as one of the Union's fundamental principles that cannot be negotiated or restricted.

After receiving the letter, Swiss President and Foreign Minister Didier Burkhalter gave his reaction on public radio. He detailed that despite the Union's unwillingness to negotiate, Brussels was open to discuss other areas of co-operation. The details of those talks remain behind closed doors.

The harsh words conveyed by Brussels are the result of a democratic referendum in Switzerland. The Commission has said very strongly that it cannot accept the different treatment of individual EU member states and that, according to Commissioner Andor, rather than a "punishment", the downgrading of Switzerland to a third country is a "logical consequence of the choice Switzerland has made".

Political movement will need to be made on each side before Switzerland can return from the wilderness.

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http://ec.europa.eu/commission_2010-2014/geoghegan-quinn/

# Cartilage repair and regeneration

## CABMM's Professor Dr Simon P Hoerstrup discusses with Professor Brigitte von Rechenberg the challenges of overcoming cartilage regeneration and the experimental work undertaken with the stifle joints of sheep

Cartilage regeneration is probably one of the most challenging adventures in modern medicine and occupies thousands of scientists all over the world. While modern molecular techniques allow the elucidating of molecular mechanisms and pathways of cartilage degeneration in many ways, results become a bit scarce when successful cartilage regeneration is attempted.

Modern scaffolds based on synthetic and natural substances, cartilage cells, as well as the use of macromolecules such as hyaluronan, are applied in experimental studies and sometimes result in promising hyaline-like cartilage structures. However, at the time of writing this feature, nobody in the world was able to come up with a technology, or method, that permanently replaces cartilage with the original hyaline structure that is able to withstand the mechanical forces long term. At the end of the cascade we are still left with osteoarthritis and, in many cases, finally with surgical joint replacements.

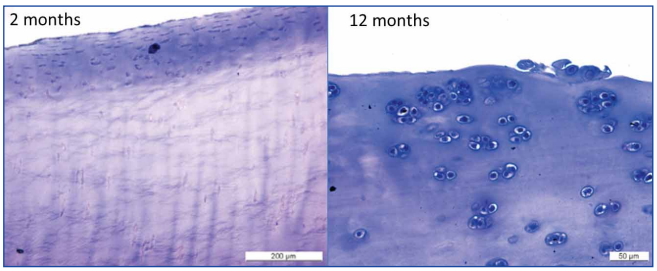
One of the reasons, believes Professor Brigitte von Rechenberg from the Musculoskeletal Research Unit (MSRU) at the Vetsuisse Faculty of Zürich, University of Zürich, is that – in contrast to the bone field – cartilage remodelling under physiological and normal conditions is practically unknown. By her logic, it is imperative to understand this basic mechanism before any progress can be made in cartilage regeneration.

### Clear connection

Usually, researchers look at either the cartilage or the bone. Moreover, there are still textbooks available that deny a connection between the subchondral bone and overlying cartilage, although in foetal and even early embryonic life they are clearly connected. In addition, it is still not understood why a tear in hyaline cartilage cannot heal and is always the start of cartilage degeneration that cannot be halted.

Von Rechenberg dedicates her research to this problem of cartilage remodelling. In her experimental work with stifle joints of sheep, her research team showed that the (dead) cartilage of pre-treated photo-oxidised osteochondral grafts was repopulated with living cells stemming from the subchondral bone.

Cells penetrated the calcified cartilage zone and grew into the dead cartilage matrix while synthesising a new matrix. At the same time, pannus formation at the surface of the photo-oxidised cartilage was observed, where cells proliferated and migrated into the deeper zones of the cartilage surface. Lastly, the methylene blue of the photo-oxidised graft diffused into the adjoining living cartilage and inhibited cartilage degeneration of the edges.




In selected circumstances, cartilage resurfacing was possible with photo-oxidised osteochondral grafts, where union between the adjoining cartilage and graft was observed. In consecutive experiments, a metaphyseal defect in the proximal tibia of 136 sheep resulted in complete degeneration of the overlying cartilage after just 14 days, which partially recovered over time (three, six and 12 months), depending on the biomimetic used to enhance bone healing of the metaphyseal defects.

The latest experiments with this animal model in sheep showed that the transcutaneous delivery of a non-steroidal anti-inflammatory drug by means of the MedDrop technology slowed down cartilage degeneration in general and, most interestingly, seemed to prevent degeneration of cartilage edges in case of a lesion at the cartilage surface. In fact, the edges appeared to be sealed together, and cells were found in what seemed to be a reparative process to heal the lesion.

It is thought that, apart from the NSAID, the oxygen carrier was part of improved cell proliferation and sealing of the edges. Although true cartilage healing may still not be possible at this point, these experiments reveal important insights into the mechanisms of cartilage remodelling and regeneration and – one day – may allow an adapted and innovative approach to an old problem.

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# DIVERGENT APPROACHES

**Horizon 2020 Projects** sets out the background to Switzerland and Israel's involvement in Horizon 2020. Whilst a deal has now been struck with Israel, Switzerland continues to be downgraded as a third country

Switzerland has one of the highest R&D intensities in the world. With an average annual growth rate of 1.9%, Switzerland outweighs its key competitors of both EU and the United States when comparing R&D expenditure as a percentage of GDP. The country has also been highly successful in the EU's research and innovation framework programmes. In the Seventh Framework Programme, Swiss-based applicants scored a success rate of 25%, far above the EU average, helping the country to benefit from €1.3bn in EU funding between 2007 and 2013.

Israel is also highly regarded within the research and scientific environment. With industry leading 80% of R&D investment, Israel measured an R&D intensity of 4.40% in 2010. The country has participated in the EU's research and innovation framework programmes every year since 1996, helping to secure participation in over 1,500 research projects and funding worth €780m.

With this backdrop, it is difficult to imagine two more divergent situations when considering participation in Horizon 2020. Following a public vote in favour of restricting mass immigration in February, Brussels downgraded Swiss participation to that of a third country. In contrast, after difficult negotiations between the two parties, Israel sealed an agreement to participate in Horizon 2020 in effect on a par with EU member states.

## Third country

As voters in Switzerland decided to narrowly pass the 'against mass immigration' initiative, the EU has been quick to react to the move by the Bern Government to reintroduce quotas restricting the free movement of people into and out of Switzerland. Brussels downgraded Switzerland's anticipated associated status to Horizon 2020, suspending applications for European Research Council grants and restricting participation in the Marie Skłodowska-Curie Actions.

Researchers have reacted with disappointment and have been campaigning for the reinstatement of associated status as soon as possible. With a significant loss in EU funding, the Swiss National Science Foundation has introduced a temporary backup scheme to mitigate the negative effects.

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## New rules

This compares with an unprecedented move in July 2013, when the EU released new guidelines regarding the eligibility of Israeli entities to receive EU grants from the start of 2014. The new rules denied access to EU grants for Israeli entities located in the Gaza Strip, West Bank and Golan Heights.

The new rules were immediately met by widespread concern from Israeli researchers, with the government publicly condemning the new regulations. Israeli minister Silvan Shalom described the move as a "big mistake", and the following months saw substantial doubt cast on whether the country could participate in Horizon 2020.

Despite these difficulties, an association agreement between the EU and Israel was signed in June 2014, placing Israel on an equal footing with EU member states. European Commission President José Manuel Barroso described the deal as "reflecting the mutual importance ... of co-operation and partnership in R&I".

The EU and Israel effectively 'agreed to disagree', with an appendix added to the guidelines stating that the EU would not be stopped from implementing them. A second appendix was added by Israel stating its objection to the guidelines from a legal and political perspective.

## Divergence

The EU's diverging behaviour towards Israel and Switzerland raises concerns over a conflict between foreign and science research policy. Whilst Switzerland has enjoyed a long, peaceful relationship with the Union, its international relations with Israel could not be more different.

Perhaps the reason for a deal with Israel lies in the comments made in the *Jerusalem Post* by the outgoing head of Israel's European Parliament Liaison Department, David Saranga. He stated that despite obstacles in negotiations, both sides recognised the importance and value of collaborating in research and science: "There are many areas where Israel is important to Europe. The fact is that we found a way to solve the [Horizon 2020] problem."

With Switzerland a major player in European science and research, it is hoped that a similar deal can be struck between Bern and Brussels. There is yet hope for Swiss researchers and their participation in Horizon 2020.

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# A DIFFICULT DILEMMA

In an exclusive interview with Horizon 2020 Projects, Professor Dr Patrick Aebischer, the president of EPFL, details the new science environment for Switzerland and the uncertain future now ahead

**The École Polytechnique Fédérale de Lausanne (EPFL) is widely considered the most cosmopolitan technical university in Europe. With 11,000 students, professors and staff representing over 120 nationalities, international research collaboration is a cornerstone to the higher education and research institute's work in engineering, basic sciences, ICT and Life Sciences. Along with ETH Zürich, EPFL is one of two Swiss Federal Institutes of Technology.**

Following Switzerland's downgrade to a third country in Horizon 2020, the EPFL and its researchers have reacted with disappointment to the new and difficult research-funding environment. To gauge reaction on the ground, Horizon 2020 Projects spoke to Professor Dr Patrick Aebischer, the president of EPFL and one of the first signatories to the petition, 'Not without Switzerland'. The petition calls for decision makers in Europe and Switzerland to enable the country to fully participate in Horizon 2020 and Erasmus+.

Speaking to Horizon 2020 Projects, the EPFL president sets out how the university is dealing with the concerns of Swiss researchers, the importance of international funding sources and the now uncertain future.

Professor Dr Patrick Aebischer

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École Polytechnique Fédérale de Lausanne

### What have been the reactions and feelings of researchers at EFPL regarding Switzerland's third country status in Horizon 2020?

This was a huge shock for all of us. The vote and the following EU decision took place shortly before Horizon 2020's first application deadline, and it could not have been worse timing.

We had to provide our community with clear answers to many questions as quickly as possible. Some questions were purely technical and rather simple, like the possibility for Swiss researchers to continue co-ordinating a European project. Others were impossible to answer immediately, for example the possibility for the EU to evaluate a Swiss European Research Council grant application, even if Switzerland was no longer able to take part in this programme as a third party country.

During the first days, some of our teams were even forced out of European project consortiums because our foreign partners did not want to take any risks a couple of weeks before final application submission. It took a certain amount of time not only to get a clear evaluation of the situation, but also to efficiently transmit this complex information to our researchers and partners, who are not legal experts.

Our status is now at the centre of political negotiation between Switzerland and the EU. We are an academic institution, and consequently our flexibility is limited. In terms of action, we mostly focus on the Swiss population. We live in a country where people can vote and decide directly about any political issue through referendums and federal popular initiatives. It is extremely important for us to explain to a broad audience the consequences of the recent vote, and this is not an easy task. Swiss people are proud of their scientific excellence – after all, we have the world's highest ratio of publications and Nobel Prize winners *per capita*. Yet for Switzerland, like any other country, science is not the first concern of the population.

EPFL is located on the banks of Lake Geneva

## How important are international funding sources in research, development and innovation to EFPL and Switzerland overall?

At EPFL, EU programmes provide the second highest financial contribution after the Swiss National Fund for Research in terms of third party research funding. Yet the main problem is not money; it is isolation.

The world of science is more globalised than ever. In this context, EU grants and subvention are strong indicators of an institution's scientific performance. A researcher who succeeds in his ERC grant application receives an international recognition mark of excellence that can literally launch his career and facilitate collaborations with scientists from other institutions. This contributes strongly to our reputation and, therefore, to our capacity to attract the best researchers from around the world. This is what good science is chiefly concerned with: getting the right people onboard. In the long term, Switzerland just cannot allow isolation if it wants to maintain scientific excellence.

## How important are the interim measures being introduced by the Swiss Government and the Swiss National Science Foundation?

We are extremely satisfied to see our government taking strong measures to help us fill the gap left by Horizon 2020, but this can only work in the short term. Recently, we learned that Switzerland may temporarily be reintegrated into Horizon 2020, though this is still yet to be agreed. Right now, we are facing an uncertain future.

### Isolated from Europe

In February, the leaders of seven Swiss research institutions signed an open letter to the Swiss Government expressing their concerns regarding Switzerland's non-association to Horizon 2020 and Erasmus+. Addressing Swiss President and Foreign Minister Didier Burkhalter, Justice and Police Minister Simonetta Sommaruga and Economic Affairs, Education and Research Minister Johann Schneider-Ammann, the prominent academics said the country's success in winning education, research and innovation grants would now be limited and that Switzerland would be "isolated on the European continent". The open letter begins by setting out the impact of third country status in Horizon 2020.

"The voting result, and the fact that the association of our country to Horizon 2020 and its participation in Erasmus+ are threatened, fill us with the greatest concern. It is not only financial losses, as Switzerland was able to win up to CHF1.5 (~€1.25) per franc invested during the Seventh Framework Programme, it is also the ability of our researchers to continue to submit projects to the European Research Council and be able to lead projects, as only requests from EU member states and Horizon 2020 associated countries are considered by the ERC. A non-association to these programmes would deeply shake the confidence of our research space, and Switzerland would harm itself. The reputation of our universities and the ability of our research institutions to continue to attract the world's best researchers, lecturers and students in Switzerland are in danger.

"We are very aware of the acute problems concerning the salvation of our association to Horizon 2020 and Erasmus+ programmes and how the necessary measures only represent a small part of a much broader problem for Switzerland. We have the greatest understanding that the Federal Council must take into account consequences for other areas and the overall environment of our country when taking decisions. Yet due to the current emergency … we are compelled today to ask the Federal Council to take all possible and conceivable action … to ensure that an association to Horizon 2020 and Erasmus+ is possible."

The letter concludes by stating that the academics are willing to discuss the issue with the Swiss Federal Council in order to "support and strengthen" the country's participation in Horizon 2020. It is signed by leaders of the Rectors' Conference of the Swiss Universities, EPFL, ETH Zürich, the Swiss National Science Foundation, the Swiss Academies of Arts and Sciences, the Rectors' Conference of the Swiss Universities of Applied Sciences, and the Swiss Conference of Rectors of Universities of Teacher Education.

**Professor Dr Patrick Aebischer**
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cabmm
center for applied biotechnology and molecular medicine

From bench to bedside and back again

# The Center for Applied Biotechnology and Molecular Medicine (CABMM)

The “Center for Applied Biotechnology and Molecular Medicine (CABMM)” is an official competence center of the University of Zurich with the objective to create a stimulating environment for interdisciplinary and translational research in order to promote scientific exchange and collaborations between basic and clinical researchers.

The CABMM shows a unique structure, combining (i) a network of existing research groups interested in scientific exchange and collaboration on interdisciplinary and translational research projects and (ii) a platform for collaborative research, where basic scientists, clinicians and veterinarians work shoulder to shoulder for the purpose of developing novel therapeutic approaches for the treatment of dysfunctional and diseased tissue.

Thereby, unlike other research centers, the CABMM is not focusing on one particular medical field, but on translational and interdisciplinary aspects. Thus, range and diversity or research being conducted within the CABMM is broad, but all research follows one aim: to facilitate the development of new treatment regimes by building a bridge between basic and clinical researchers.

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