

NOVEMBER 2016



**IBSA FOUNDATION**  
*for scientific research*

## *newsletter*

**PROMOTING SCIENCE AND A SCIENCE CULTURE WITH PASSION, THROUGH RESEARCH AND EDUCATION: PURSUING OUR MISSION USING DIFFERENT LANGUAGES**

INSIGHTS FROM  
THE FOUNDATION

**AT THE FORUM TITLED *NEW TECHNOLOGIES TO TREAT NEURODISORDERS: NEUROPROSTHETICS* INTERNATIONAL LEADING EXPERTS DISCUSSED THE SIGNIFICANT PROGRESS MADE IN THE FIELD OF NEUROENGINEERING**

FOCUS ON

**ABSTRACT COMPETITION AWARDS AT THE FORUM TITLED *NEW TECHNOLOGIES TO TREAT NEURODISORDERS: NEUROPROSTHETICS - HEALTH LITERACY - WHAT IS THIS?***

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Promoting science and a science culture with passion, through research and education: pursuing our mission using different languages

## FOCUS ON

At the Forum titled *New technologies to treat neurodisorders: neuroprosthetics* international leading experts discussed the significant progress made in the field of neuroengineering

## ACTIVITIES

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# Insights from the foundation

## Promoting science and a science culture with passion, through research and education: pursuing our mission using different languages

The activities of our Foundation in these past months have focused on sharing recent developments in science and the importance of recognising true science. We did this through various initiatives targeted to different audiences, engaging not just experts in varied fields and younger scientists (under 35 years of age), but also middle-school and high-school kids as well as patient organisations. In addition to the three **Abstract Competition at Forum awards** delivered at the Geneva Forum dedicated to the new frontiers in neuroengineering

that featured the participation of international leading experts, and the two **EFIC® - IBSA Foundation-European Journal of Pain Publication Awards** for 2015 delivered in Dubrovnik last September, our Foundation promoted a novel, creative project joining up science and comics. Called **Pasteur for boys and girls** and targeted to middle-school and high-school kids, this project aims at instilling in youngsters a passion for science and research and helping them appreciate their importance, by engaging and inspiring them. The project includes



# Insights from the foundation



a competition titled *Misinformation on the internet: learning to recognise it!* aimed at educating young people to critically assess information they come across on the internet and helping them use online resources critically and responsibly. The ultimate goal being to groom them into conscious adults capable of discerning true science from fake science especially when dealing with health information so that they can make informed decisions and take actions that protect and promote their health.

The same theme under a different slant was the subject of another initiative of our Foundation, the **Health Literacy** project. Aimed at patient organisations, this projects was implemented this fall in the Italian cities of Rome and Milan. Albeit not much discussed in Italy, health literacy is a topical issue given that the internet has become more and more central as a source of health information worldwide.

Over these past months, pursuing our Foundation's mission of promoting science and a science culture at all levels, we have used different languages and addressed varied audiences. An agenda and efforts in which we engaged passionately, that have been very well-received and successful, encouraging us to move forward with the same determination in planning activities for 2017 with a wealth of new ideas, staying on the path we have trodden so far.



## At the Forum titled “*New technologies to treat neurodisorders: neuroprosthetics*” international leading experts discussed the significant progress made in the field of neuroengineering

Pioneering prostheses that are increasingly lifelike and can feel even the lightest touch such as a caress are going to dramatically improve quality of life for millions of patients, as are new treatments based on brain stimulation which may cure prevalent conditions such as diabetes, obesity, infertility and cancer. Our Foundation organised the Forum titled “*New technologies to treat neurodisorders: neuroprosthetics*” at the Biotech Campus in Geneva, Switzerland, to discuss these developments with international leading experts. An event of great scientific relevance confirmed also by the high turnout of young students and researchers.

Neurotechnologies can now offer great benefits for many types of patients. For example, they can help people with neurological disabilities due to stroke, Parkinson’s disease, spinal cord injuries or hand amputation. For people with such disabilities a bionic hand with the same dexterity as a natural hand is being developed, a bionic hand with the ability of doing fine movements and feeling a whole range of touch sensations. The challenge going forward is to see if natural feeling can be restored in its full breadth and depth for people with these disabilities and if this can facilitate embodiment of the prosthetic limb i.e. greater control of



movements and ability to feel the different textures of objects. This would give patients much better motion control and they would get back the ability they lost after an accident or a disease to perform a series of everyday activities.

The Geneva Forum provided also an opportunity for discussing themes in the multidisciplinary field of bioelectronic medicine.

Scientists are finding increasing evidence that the onset of certain diseases, e.g. diabetes, has to do with something going awry in the autonomic nervous system. If devices capable of restoring its normal functioning were to be developed these diseases may regress. And indeed game-changing devices acting directly – through electrical stimuli – on the autonomic nervous system, hence on the mechanisms governing our organs, are going to be developed in the coming years.

At the Geneva Forum our Foundation confirmed once again its commitment to promoting science progress and advancement of scientific knowledge through its support to young investigators under 35 years of age engaged in fundamental and clinical research. On that occasion, our Foundation delivered three CHF1,000 awards to the winners of the Abstract Competition at Forum for their work judged to be most brilliant and innovative in the field.



## Abstract competition at the forum titled *New technologies to treat neurodisorders: neuroprosthetics*

The Forum titled *New technologies to treat neurodisorders: neuroprosthetics* was the occasion for our Foundation to confirm once again its commitment to promoting science progress and advancement of scientific knowledge.

Supporting young investigators under 35 years of age, our Foundation delivered three CHF1,000 awards to the winners of the Abstract Competition at Forum.

**Marco Bonizzato**, Bertarelli chair in Translational Neuroengineering, Centre for Neuroprosthetics, Ecole Polytechnique Fédérale de Lausanne, Switzerland with the abstract titled “High-through put brain-spinal interface in rats with contusion spinal cord injury”;

**Anna Vybornova** Faculty of Life Sciences, Ecole Polytechnique Fédérale de Lausanne, Switzerland, with the abstract titled “Statistical testing based on realistic null hypotheses: the surrogate method for graph signals with application to electroencephalography data”;

**Simon Borgognon and Jérôme Cottet**, Laboratory of neurophysiology of action and hearing, department of Medicine, Université de Fribourg, Switzerland, with the abstract titled “Autologous neural cells ecosystem (ANCE) transplantation as therapy for Parkinson’s disease: a promising approach”.



## Health literacy - what is this?

Last October 12 and 13, in Milan and Rome, respectively, our Foundation held two meetings on Health Literacy, coordinated by Professor **Peter Schulz**, USI, Lugano, Switzerland, and Professor **Michaëla Liuccio**, Rome *La Sapienza* University, Italy.

**Why did you have meetings on such a specific theme that is not much discussed in our country?**

The idea came up and was developed after our 2015 e-Health workshop. At that workshop two things emerged clearly: the growing importance of the internet as a source of health information and the worrying lack of knowledge regarding health in the general population. In other words, the average person navigates the internet searching for information about conditions ranging from the most trivial to the most complex, without having basic skills to determine whether the information found is true and accurate and whether the source is reliable or not.

Not much discussed in Italy, but an issue that is being tackled in other countries, health literacy is just this: the ability to understand and assess the accuracy and reliability of health information.

On this theme we decided to focus our mind and efforts to tackle the elements of concern that had emerged at the workshop. So, we kick-started a collaboration with Rome La Sapienza University and Lugano USI and with these institutions developed



a pioneering educational endeavour that we intend to expand in the future and delivered it to patient organisations over two days, one in Milan and one in Rome.

**Why did we choose to start with patient organisations?** Because they are an increasingly valuable link between the medical community and the needs of the patients they represent, because these organisations are or should be a source of information and support for their members and for patients in general, and, as such, they can be drivers of virtuous practices and synergies in the health field. The interest these organisations have shown for the initiative, their turnout at the meetings and their request for a long-term, structured commitment in this area gave us confirmation that the choice we made was a good one and encouraged us to continue our work with even greater determination and implement this project again next year.

## **Pasteur for boys and girls, a novel project. Kickoff of a competition on fake information circulated over the internet and how to recognise it.**

Presented at a press conference held at Rome *La Sapienza* University on October 20, 2016, *Pasteur for boys and girls* is a novel project designed to help young people learn and recognise true science through a proactive and creative approach. The project is for middle-school and high-school kids and features a series of books and a nationwide competition titled *Misinformation on the internet: learning to recognise it!* The deadline for entering the competition is **January 31, 2017** and winners will be announced on the websites of the promoters ([www.istitutopasteur.it](http://www.istitutopasteur.it) and [www.ibsafoundation.org](http://www.ibsafoundation.org)) within February 28, 2017.

Promoted by the IBSA Foundation for scientific research and the Pasteur Institute Italy, the project received commendations from Italy's Minister for Education, Universities and Research **Stefania Giannini** and Italy's Health Minister **Beatrice Lorenzin**.

The nationwide competition titled *Misinformation on the internet: learning to recognise it!* The competition is for middle-school and high-school students who will participate in two separate sections, and entails **submission by students** of comic panels on the theme of fake information, especially fake science, circulated on the internet and how to recognise it. The goal is educating



young people to critically assess information they come across on the internet and helping them distinguish sites providing true science information from those peddling fake science. Students can enter the competition either as a team or individually and can submit up to six black-and-white or colour comic panels.

### Competition: the judging panel and prizes

The judging panel will be composed of representatives from the IBSA Foundation for scientific research, the Pasteur Institute Italy, the Rome School of Comics and Carocci publishing house. The schools submitting the best comics will win a **cash prize** for purchases of science materials and for setting up or boosting their science lab - as well as **optical (light) microscopes for their lab**. The schools achieving one of the first three places in each section of the competition will also win a **special one-day class** featuring a session with a Pasteur Institute scientist opening the doors to his/her lab for students to perform experiments and participate in other hands-on activities, and a session with a Rome School of Comics professor teaching kids how to create comics, from writing the storyline to drawing panels.

### Pasteur for boys and girls: the book series

*Pasteur for boys and girls* is also the title of a series of books (published by the Italian publishing house Carocci) that will be distributed for free in most Italian middle and high schools. Designed to make young people learn science in a playful way,

each book features scientific content authored by an expert in the given science field followed by comics on the same theme in the second part of the book. The comics were drawn by people from the Rome School of Comics based on a story written by students. In the first book, titled *Stem cell stories*, scientific content was written by Antonio Musarò, Professor of Histology and Embryology at Rome *La Sapienza* University, while the story for the comics was written by students from *Poggiardo* Middle School, Lecce. In the second book, titled *Cops and robbers. Immunology and immunisation*, the scientific part was authored by Professor Alberto Mantovani and Professor Angela Santoni, while the story for the comics was written by students from a comprehensive school located in a suburb of Rome.



## EFIC® - IBSA Foundation - European Journal of Pain Publication Award 2015

On September 21, 2016 in Dubrovnik, Croatia, the opening ceremony of the first “EFIC Topical Symposium on acute and Joint Pain” featured the delivery of two **EFIC® – IBSA Foundation – European Journal of Pain Publication Award 2015**. We interviewed the two winners, who received a €2,500 prize each from the IBSA Foundation for Scientific Research for their article published in the European Journal of Pain in 2015.

Interview with Ms. **Elisa Carlino**, Research Fellow, Italy’s Turin University Neuroscience Department, who won the award for her publication titled “Role of explicit verbal information in conditioned analgesia”

1) Ms. Carlino can you walk us through your research work?

My main field of research is the placebo effect with focus on related neurobiological mechanisms. The placebo effect has proven to be significant on pain. When referring to the placebo effect, it is largely the expectation effect that is considered i.e. the beneficial effect of positive expectations about the placebo. We conducted a study on healthy volunteers and demonstrated that the explicit expectation of receiving less painful stimuli is crucial to attain placebo hypoalgesia, i.e.

decreased sensitivity to painful stimuli, following administration of placebo.

In particular, through conditioning we modulated the sensitivity to painful stimuli in healthy volunteers. In the study, in one of two groups we told participating volunteers they would feel more or less pain when certain images would appear on a screen (greater pain when seeing the sign ‘+’ and less pain when seeing the sign ‘-’).

In the first stage of the study, unbeknownst to the volunteers, we actually changed the intensity of the painful stimulus, to condition their sensitivity. In the second stage, we kept the painful stimuli unchanged at the same level to see if the volunteers would respond to the stimuli as they did in the first stage. In the other group of volunteers, we had the same tests but without telling the volunteers the meaning of the stimuli, in other words we conditioned them implicitly. Findings show that only explicit conditioning led to modulation of pain, i.e. to placebo response, in the second stage of the study.

Indeed, only explicitly conditioned volunteers subjectively reported to feel less pain in the second stage of the study and showed an objective reduction of sensitivity to the painful stimuli as measured using laser-evoked potentials (LEP), an electrophysiological recording method.

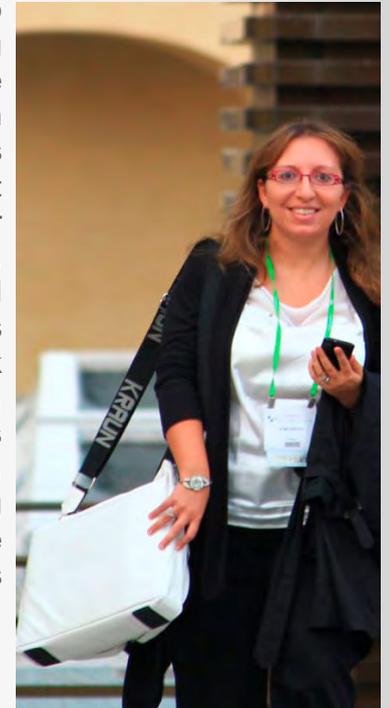
2) What future prospects may your research open up?

The study has major clinical implications. The fact that explicit expectations play a crucial role in pain modulation has significant implications for clinical practice, and in particular for the role of physicians when administering treatment. The study shows how important explicit verbal communication and interactions between doctors and patients are to attain better clinical outcomes for the patient. Explicitly informing healthy volunteers about the possible modulation of pain has proven to improve outcomes in the study. Similarly, it is important to explicitly inform patients they will feel less pain after a certain medication has been administered to them, instead of just administering it and saying nothing about what they should expect. The goal is of course improving the efficacy of treatment and easing patient clinical symptoms. So, in general, research on the placebo effect has allowed us to get scientific evidence of the importance of a dialogue between patients and their doctors and the effect that such dialogue has on the patient brain.

3) What does it mean for a young investigator like you to be the winner of an award such as the “EFIC®-IBSA Foundation – European Journal of Pain Publication Award”, whose purpose is to support research by providing financial

support and contributing to the dissemination of knowledge?

For me, it came as a surprise and I was very happy to win the award, a great recognition for me both personally and professionally. Any research project, from planning to carrying out the study to writing the report on findings and ultimately publishing them, is a huge effort. You see your idea grow and develop through to publication. Being rewarded for the effort and dedication is truly gratifying. It is increasingly difficult to get funding for research work in Italy, and it is fundamental to have one's ideas and scientific work be known vastly. So, professionally, this award is a huge help, especially for a young investigator at the beginning of her or his career.



Interview with Mr. Mikkel Gram Industrial Postdoctoral Fellow with Aalborg University Hospital and Lundbeck A/S, who won the award for his publication titled “Machine learning on encephalographic activity may predict opioid analgesia”

1) Mr. Gram can you walk us through your research work?

I would love to. My main topic was Personalized Medicine within Pain treatment using opioids. Here, a very common problem is that many patients do not respond to the treatment with opioids and thus continue having pain, with the added side-effects of the opioid treatment. This is due to a large variability in effect between individuals for a given opioid, meaning that what works for one patient might not work for another. This is handled clinically by switching people to another opioid, until one is found that works for the individual. However, currently there is only trial and error to help the clinician decide which opioid to use, and subsequently many patients suffer from inadequate treatment.

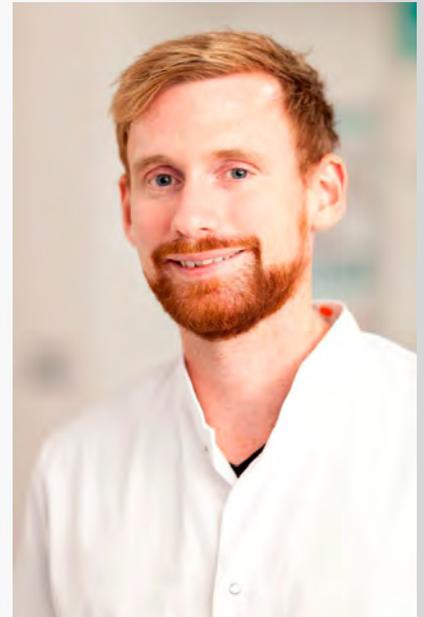
Personalized medicine is about helping the doctor make the right treatment choice for the individual patient before giving any analgesics. The idea is that measurements before treatment can tell if the patient will respond to a given opioid or not. The big question is which measurements will give that information. So far attempts using quantitative sensory testing has been used with variable results, but we wanted to go in another direction with a more objective measurement – the electroencephalogram (EEG). Our reasoning being that opioids mainly

act in the central nervous system, and individual differences here could tell us something about the analgesic response.

We therefore set up a randomized experimental study with morphine and placebo, where patients were subjected to the painful cold pressor test before and after drug administration.

EEG was also recorded before drug administration, and it was these measurements we hoped would help us predict response. The subjects were divided into responders and non-responders, based on their pain ratings during the cold pressor test, and the EEG of the groups were compared against each other.

This is where machine learning came into the picture, which is a novel method within the medical field, but within engineering it is utilized much more. This way of analysis attempts to find patterns in the data, which are not apparent to the human eye. By combining several features from the EEG, we managed to build an algorithm that successfully predicted who would respond to morphine or not. This is a very interesting finding due to the objective





nature of the EEG, and the novelty of the applied methods.

## 2) What future prospects may your research open up?

The research in healthy volunteers which we conducted gave us a clear indication that we were on to something with the approach of EEG and machine learning. That gave us the confidence to move forward with clinical experiments, to both in postoperative patients and in chronic pain patients. The study on postoperative pain yielded very similar results to the first paper and is recently published in the European Journal of Pain. The study on chronic pain is under development still, but the preliminary results again confirm the hypothesis. Together it all points to personalized pain medicine being possible at some point in the future.

## 3) What does it mean for a young investigator like you to be the winner of an award such as the “EFIC®-IBSA Foundation – European Journal of Pain Publication Award”, whose purpose is to support research by providing financial support and contributing to the dissemination of knowledge?

It means a great deal for a young researcher such as myself, especially since the methods I use are a bit unusual within many research field due to my background as an engineer. Therefore, it has sometimes been a challenge to explain the methods

to other researchers, which is a shame since I believe there is great potential within medicine for methods such as machine learning. Getting the award is a huge deal for me because it means that our approach to personalized medicine, using an objective marker such as EEG has caught the eye of other renowned researchers who are considering it to be a step in the right direction for the field. This is a huge honour for me, and a great joy that all our hard work has led to this!

*For further information on our Foundation, its activities, past and future projects, science news, interviews, photos and videos, registration forms and media coverage of events please visit [www.ibsafoundation.org](http://www.ibsafoundation.org).*