

The 6th Barcelona VPH Summer School focused on
“**Highly Multifactorial Disorders**” was held on 23rd-27th, May
2022 in Barcelona!



6th Barcelona VPH Summer School

23-27, May 2022



The VPH Summer School was co-organized by BCN MedTech at the Department of Information and Communication Technologies, Universitat Pompeu Fabra (UPF), Chair: Prof Jérôme Noailly and by the Virtual Physiological Human Institute (VPHi), with the collaboration of the UPF department of Experimental and Health Science and the QUAES Foundation.

The event provided junior engineers, early researchers and medical doctors with an integrative view of state-of-the-art research for in silico medicine, following a complete pipeline from basic science and clinical needs, to model application.

This year, we had the pleasure to welcome 23 speakers and 80+ attendees (online and offline), from different international institutions and Disc4All Project Members.



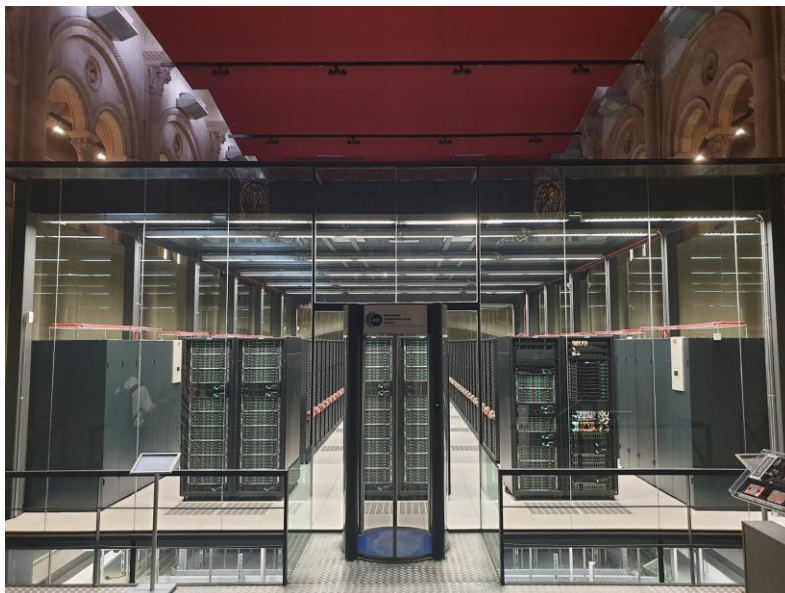
It was a memorable event with 14 lectures, 1 workshop and 1 honorary VPH lecture, given by leading international researchers.



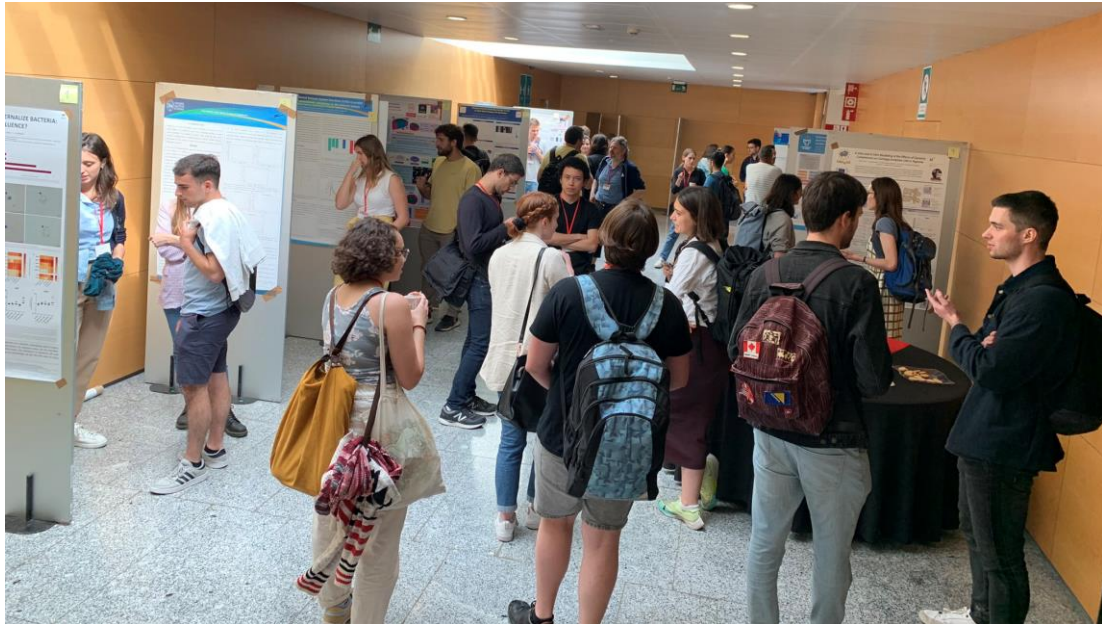
The key methodological and technological concepts were enriched by afternoon hands-on sessions that stand for 15,5 hours of transversal training in in silico medicine technologies during the whole week. The most of the attendees participated to the 6 hands-on sessions led by a total of 16 expert researchers (9 from UPF and 7 external). See the agenda below.

6th Barcelona VPH Summer School - May 23rd-27th, 2022, UPF						
Highly Multifactorial Disorders						
Department of Information and Communication Technologies, Universitat Pompeu Fabra						
		Monday, May 23rd	Tuesday, May 24th	Wednesday, May 25th	Thursday, May 26th	Friday, May 27th
		<i>Basic Science and Clinical Understanding</i>	<i>Acquisition, processing, quantification</i>	<i>Organ, cell, molecular</i>	<i>Implementation, validation, coupling</i>	<i>Understanding, decision-support, therapy support</i>
Auditorium	08:30 - 09:30	08:30 - 09:00 Registration 09:00 - 09:30 Welcome				08:30 - 09:30 Workshop "Business in Innovative Health Technologies", Albert Domingo
	09:30 - 11:00 (Keynote Speakers)	Ricard Solé (UPF, ICREA) - Chair: Jérôme Noailly	Jari Hyttinen (University of Tampere) - Chair: Oscar Camara	Julio Saez Rodriguez (Heidelberg University) - REMOTE - Chair: Baldo Oliva	Ilse Jonkers (KU Leuven) - Chair: Simone Tassani	Emmanuelle M Voisin (VCLS) - Chair: Miguel Angel Gonzalez
	11:00 - 11:30	Coffee break				
	11:30 - 12:30	Vera Francisco (Institute of Biomedical Research of Valencia) - Chair: Sofia Tseranidou	Gemma Piella (UPF) - Chair: Exarchos Kanelis	Rami Korhonen (University of Eastern Finland) - Chair: Jorge Mateos	Francesco Pappalardo (University of Catania) - Chair: Maria Segarra	Keita Ito (TU/e) - Chair: Paola Bermudez
	12:30 - 13:30	Aron Lazary (NCSD) - Chair: Jérôme Noailly	Jacques Huyghe (University of Limerick) - Chair: Carlos Ruiz	Silvia Blemker (University of Virginia) - Chair: Katherine Crump	Fabio Galbusera (Schulthess Klinik) - Chair: Andrea Nuesch	Ludovic Humbert (Galgo Medical) - Chair: Maria Paola Ferri
Cafeteria on Campus	13:30 - 14:30	Lunch				
Hall Tallers or Auditorium	14:30 - 16:30	14:30-15:30 Visit MareNostrum 30 pers max 16:00-16:30: Hands-on Introduction (Auditorium)	Hands-on (Rooms Tallers)	Hands-on (Rooms Tallers)	Hands-on (Rooms Tallers)	Hands on presentations + QUAES Best hands Award / VPHI Best Poster Award (Auditorium) Coffee Break: 15:30-16:00 (Auditorium Hall)
	16:30 - 17:00	Coffee Poster (Auditorium Hall)				
	17:00-18:00			Hands-on (Rooms Tallers)		16:00-18:00 Disc4All-QUAES Open Round Table "Good practices and Ethics in In Silico Medicine & e-Health" (Auditorium)
	18:00 - 19:30	Hands-on (Rooms Tallers)	Hands-on (Rooms Tallers)	Honorary VPH lecture (Auditorium) - Shayn Pierce-Cottler (University of Virginia) - Chair: Zeynep Karagoz	Hands-on (Rooms Tallers) + Preparation of the hands on presentations	18:00-19:00 Summer School Closure & farewell drink (Plaça Gutenberg)
Guttenberg Square on Campus	19:30 - 21:00	Catalan Beer Tasting				

On Monday, 23rd participants had an opportunity to visit **Visit MareNostrum, Barcelona Supercomputing Center** (BSC-CNS) and its facilities with supercomputer whirring away in a Barcelona chapel.



The everyday scientific talks and practical works took place together with poster sessions that fed the scientific discussions during the afternoons.



The **Best VPHi Poster Award** was won by Sofia Tseranidou with the poster “Nucleus pulposus cell network modelling in early intervertebral disc degeneration”.



AWARD CERTIFICATE

The 2022 VPHi Best Poster Award is presented to

Sofia Tseranidou

Universitat Pompeu Fabra (UPF)

for her poster entitled
“Nucleus pulposus cell network modelling
in early intervertebral disc degeneration”

At the 6th VPH Summer School on Friday May 27th, 2022

DR. JEROME NOAILLY
Scientific Chair of the VPHi Student Committee

The **Best Hands-on** was also awarded by the UPF-QUAES Chair, and the winners were: Judith Piet, Jean Arnau Pinto, Ludovica Cestariolo, Anna Ramella, Davide Goldoni, Irais Garces de Marcilla, Rafael Benito, Dimitrios Lialios, Estefano Munoz, Morteza Rasouligandomani.



Half way of the event, the delegates could relax and discuss during the Catalan beer tasting that has become a traditional social event since the 1st summer school, in 2016.



The last afternoon of the VPH Summer School hosted a round table and farewell drinks with 50+ attendees, gathering patients, physicians, researchers and public authority representatives to discuss on "Good Practices and Ethics in in silico Medicine and e-Health".



Undoubtedly, the 6th VPH Summer School has been a great inspiring experience, for both junior and senior scientists!

Stay tuned! Watch the recordings on our YouTube: Disc4All European Innovative Training Network: <https://www.youtube.com/channel/UCorjbmLkHPXu6JVBg0rr-EA>
Join & follow us in LinkedIn: @Disc4All_EU_Project, Twitter @Disc4all_EU, website: <https://disc4all.upf.edu/>.

Read the fantastic press release below by **Marta Pulido (IDIBAPS, Universitat de Barcelona)**.

The VPH Summer School closes its 6th Edition with the QUAES-UPF Roundtable "Good Practices and Ethics in in silico Medicine and e-Health"

- The VPH Summer School is an annual event co-organized by BCN MedTech and the Virtual Physiological Human Institute (VPHi), with the collaboration of the QUAES Foundation.
- From industrials, healthcare professionals and researchers to patients and the general population, all stakeholders should work together to define and implement a fair and ethical digital health.
- Patients and their data should be at the center of in silico medicine and e-Health development. Their rights must be protected and the misuse of data prevented.

Barcelona, 2nd June 2022. On May 27th in the afternoon, the 6th VPH Summer School hosted a Roundtable which gathered internationally renowned experts from the public and private sector, as well as, patients' representatives, to discuss good practices and ethics in in silico medicine and e-Health. "Digital health and in silico medicine can transform the healthcare and the workforce worldwide. But, how can we ensure that these models can properly anticipate evidences and guarantee a fair and ethical health system for everyone?" wondered **Jérôme Noally**, principal investigator at BCN MedTech-UPF and chair of the VPH Summer School.

José Manuel Santabárbara, R+D+I coordinator for patients at QUAES Foundation, **Josep Vergés**, president and CEO of Osteoarthritis Foundation International, **Marco Viceconti**, full professor of computational biomechanics at the University of Bologna, **Luca Emili**, founder and CEO of InSilicoTrials, **Gordon Johnston**, chartered engineer at Johnson & Johnson and **Alessandro Blasimme**, reader of bioethics at ETH Zürich gave their views on this and other relevant ethical issues moderated by **Marta Pulido**, science journalist and communications officer at IDIBAPS.

Can we predict life?

In 2005, the Virtual Physiological Human (VPH) was born as the European version of the Physiome project, to develop reproducible, multiscale models of the human anatomy and physiology for clinical practice. “In recent years, computer and mathematical models have expanded to the point of being able to predict health, albeit partially and incompletely. Even so, there are success stories of in silico tools approved to replace animal models”, stated **Viceconti**. A substitution that the European Union plans to make a reality in 2030 according to **Emili**.

Despite the promises of in silico medicine, there are some major ethical concerns to be addressed. For instance, bias or misuse of data. “The use of algorithms in drug discovery is very appealing, because they can help to predict chemical and physiological features of molecules. But they are also black boxes, and this lack of transparency hinders the mechanistic interpretation behind their predictions. Furthermore, another problem is the possible misuse of these algorithms for the development of pharmacological weapons”, explained **Blasimme**. “Not to forget one of the most discussed ethical issues: algorithm bias, which comes from biased datasets, which mainly represent white, male, middle-aged patients, used to train artificial intelligence. If left uncorrected, it can amplify inequities in the health system”.

Fairness and justice

Amidst the digital revolution of health, one can wonder about the availability of the e-Health services. Would this technology be inaccessible for underserved communities or populations, such as elderly, homeless, and people suffering from rare diseases? Can digital illiteracy deprive people of access to the healthcare system? For **Emili**, the answer seems clear: no. “If we solely focus on Europe, it is very likely that risks and benefits are well balanced. However, on a global perspective, and especially in regions like China, India or Africa, digital health could benefit many people who could have access to innovative tools that otherwise would not be developed for them. Standard healthcare systems are rarely available for these people. But, for instance, surgical robots like Da Vinci could assist populations who are miles away from a hospital or a doctor”.

“The key for justice is to adapt solutions to the level of the technology of countries”, recognized **Johnston**. “It is also the responsibility of all parties, regulators, companies and even patients, to ensure the transparency and understandability of the algorithms, so that they are accessible to everyone”. Another important point to ensure inclusive and fair digital medicine is to consider not only the most prevalent diseases in Western countries, as well as to make sure that medical devices are suitable for everyone. “A remarkable case are pulse oximeters, which are inaccurate in people

with dark skin”, highlighted **Blasimme**.

Patients and their data should be at the center

In order to make people capable to actually use the opportunities offered to them if they wish, truthful information about the benefits and risks of engaging in digital health has to be provided to the individual users. Especially regarding the use of their data, which is key to the advancement of digital medicine. But, should patients be the sole owners of their data? ”Undoubtedly, they have the right to have access to all their data. But, they are also motivated to share it in order to help in the advance of knowledge. However, they do want to be informed of the results of the studies and trials in which they participate, which is not always the case”, said **Vergés**. “Patients’ rights should be guaranteed. We must explain to them how their data will be used and make sure they understand what they are agreeing to in the informed consent form”, added **Santabárbara**.

Emili pointed out that as long as the data maintains the anonymity of the individual, data sharing should be strongly encouraged, but avoiding that it becomes a data market. “That is very difficult to control, but at the end, every stakeholder, commercials, providers, has their own professional ethics to stick to the rules. Furthermore, what is really interesting for industry is the complete dataset of a population, instead of individual and recognizable data”, stated **Johnston**. “It is worth saying, however, that despite the advances in cryptography, we cannot guarantee 100% data privacy. So there is a need to have interventions to prevent the harmful effects of privacy breaches. But, in no case, this should prevent us from advocating for data sharing”, defended **Blasimme**.

Thorough the session, all the experts agreed on the importance of communication, patients’ empowerment and education, transparency, as well as the need for all stakeholders involved to work together in order to define proper regulatory frameworks and policies, as well as to implement a fair and ethical digital health. “It is not uncommon for patients to be included only in the later stages of a research project or a clinical trial, when they should be there from the beginning if we want the outcomes to be relevant for them. For instance, did you know that pill color influences adherence to treatment? Patients are more willing to take blue and green pills than the red ones. So for the sake of the future of in silico medicine, we should listen to them”, concludes **Vergés**.

About

The VPH Summer School is an annual event co-organized by BCN MedTech at the Department of Information and Communication Technologies, Universitat Pompeu Fabra (UPF) and by the Virtual Physiological Human Institute (VPHi), with the collaboration of the QUAES Foundation. It provides junior engineers and medical doctors with a complete overview of state-of-the-art research for in silico medicine. This year, its 6th edition was held in Barcelona from May 23rd to 27th.

The Virtual Physiological Human Institute for Integrative Biomedical Research, in short VPH Institute (VPHi), is an international non-profit organisation registered in Belgium, whose mission

is to ensure that the Virtual Physiological Human is fully realised, universally adopted, and effectively used both in research and clinic.

The QUAES Foundation is a non-profit organization dedicated to promoting the dissemination of medical and scientific advances among patients. Its vocation is to share knowledge in a rigorous and accessible way, generating a real meeting point between society, academia and health professionals. With Mediterranean roots, this organization is promoted by Ascires Grupo Biomédico, of which the Catalan Cetir is a member.

Acknowledgment:

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Dissemination Partners: [SimCardioTest](#), Simulation of Cardiac Devices & Drugs for in-silico Testing and Certification, EU Horizon 2020 Research & Innovation Program Digital transformation in Health and Care SC1-DTH-06-2020, GA: 101016496, [Bioinformatics Barcelona](#), [European Society of Biomechanics](#), [CompBioMed](#), [Avicenna Alliance](#).

