Avicenna Alliance Newsletter
SEPTEMBER – OCTOBER 2024

In this Newsletter

Our Open Ecosystem is Talking

By Thierry Marchal
President & Secretary General

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We had some excellent discussions at the Avicenna Day 2024 in Stuttgart on September 3rd. Members of the different communities (academics, industry, but also regulators, clinicians and patient representatives) actively contributed to the discussion with great enthusiasm. It was not surprising, but very encouraging, to hear that we are all guided by patient health and comfort, even if some groups lean more towards rapid medical innovation, others towards optimizing patient safety, and still others towards innovative breakthroughs: we all share the same goal: patients health and wellness.

Many regulatory bodies are keen to embrace *in silico* approaches

We knew that the FDA has been very interested in *in silico* methods for many years and accepted them in accordance with the various existing Guidance and standards. During our Avicenna Day, it was very encouraging to hear regulators from other regions, people from the UK and Europe, sharing the same enthusiasm while continually reminding us that patient safety is their primary concern. They also recognize that *in silico* could actually help increase patient safety.

Clinicians are the cornerstone of in silico clinical trial

Clinicians have been the driving force behind clinical trials for a thousand years (Avicenna's Book of Healing was published in 1025). Beyond the adoption of *in silico* methods for clinical applications, it is also essential to convince clinicians (involved in clinical trials) that *in silico* clinical trials could indeed Refine, Reduce and (partially) Replace clinical trials, and of course Precede them. It is essential to engage with these clinicians so that they can appreciate the immense value they can derive from *in silico* methods.

Multiplication of *in silico* related standards.

The third recommendation that we received was related to standards. Since TRUST is an essential element in the widespread approval of *in silico* methods, credibility could be enhanced by compliance with standards that explicitly refer to *in silico* methods, insofar as they exist. *In silico* methods would then be perceived as a cost- and time-effective way of demonstrating that a solution has been tested in accordance with a standard.

We still have a long way to go before *in silico* methods are accepted like any other method for providing evidence as part of the regulatory approval process. But unlike a few years ago, the various stakeholders are becoming increasingly familiar with this technology, fully perceive its benefits for patients, and are keen to embark on this exciting adventure.

Let's continue this very encouraging discussion with all stakeholders.

Very valuable panel discussions with numerous experts during the Avicenna Day

Thierry

Spotlight on the Public & Patient Involvement (PPI) Task Force

By Steven Levine & Cyrille Thinnes
Task Force Leaders

Person-Centric Medical Research: A Vital Step Toward Better Healthcare

The Public and Patient Involvement (PPI) task force of the Policy Development Working Group is spearheading the first internationally coordinated PPI initiative focused on *in silico* medicine. This effort aims to bridge the current gap between the medical innovation process, societal benefit, and public understanding, by involving patients and the public in the development of new technologies from the start.

To ensure close alignment with the needs of Avicenna Alliance (AA) members, the task force began by assessing current PPI practices and perceptions. The internal survey revealed that awareness of PPI is relatively low, perceptions of its value vary significantly, and there is a risk of falling behind other medical fields that have already embraced PPI. As a result, the task force is developed a strategic roadmap focused on three key areas: 1) raising PPI awareness, 2) supporting PPI activities, and 3) fostering a cultural shift to promote a more person-centric research environment. These goals are outlined in the task force's first position paper.

Currently, the PPI task force is working on a new publication with the aim to provide a PPI toolkit for *in silico* research, to be submitted to a peer-reviewed journal. The first draft it expected by spring 2025, for a final draft and submission by summer 2025. The task force is also developing a "plain language glossary" that will translate the relevant complex medical and scientific jargon into clear, accessible language to foster understanding by, and communication with, non-experts and the public in general.

Communication and education are fundamental to this initiative. For example, people shall be aware of the importance of their health data for the creation of a digital twin, i.e., the digital representation of their biology and physiology. Without high-quality data, the utility of these technologies is limited, thereby hampering the development of new tools for improving health outcomes. Nevertheless, enabling avenues like digital health records remain underdeveloped in many countries. Understanding this risk/benefit balance is an essential component of effective PPI for *in silico* medicine.

One of the ongoing challenges the task force will address is fostering a more person-centric approach in clinical trials. For example, patients' and carers' quality of life often does not correlate with traditional clinical endpoints, like a biomarker measurement. The task force's mission is to shift this focus to ensure that people remain central to research and development efforts.

Overall, the PPI task force is serving the AA membership by laying the foundation for a more inclusive, person-focused approach in *in silico* medicine. By integrating patient perspectives into research and innovation, it will lead to more effective medical technologies and drive rapid adoption that will ultimately improve system-wide efficiencies and healthcare as a whole.

Spotlight on Voisin Consulting Life Sciences (VCLS)

by Emmanuelle Voisin
Founder & CEO

Voisin Consulting Life Sciences (VCLS) is a global regulatory consulting firm that plays a critical role in supporting life sciences companies as they navigate the complex processes of product development and regulatory approval.
Founded in 1997, VCLS has become a trusted partner for pharmaceutical, biotechnology and medical device companies, offering expertise in drug and medical device regulatory strategy, non-clinical and clinical development, clinical trial design, access to market, and post-approval life cycle management. Their focus spans various therapeutic areas, in particular oncology, and also rare diseases, cell and gene therapies, and digital health.

With a strong global presence and a multidisciplinary team of scientists, MDs, Health Economists and regulatory experts, VCLS provides tailored solutions that align with requirements from health authorities, FDA, EMA and NMPA as well as payers. They are especially known for their expertise in advanced therapies and emerging technologies.

Beyond their consulting services, VCLS is a very active member of the Avicenna Alliance, advocating for *in silico* medicine. VCLS has been instrumental in guiding the Avicenna Alliance's Policy Development Working Group and is currently leading the *In Silico* Application (ISA) Working Group. Their leadership in these groups highlights their commitment to advancing *in silico* methodologies, fostering innovation, and influencing policy in the regulatory landscape.

Introducing BIOREME

by Prof. Bindi Brook
Leader

BIOREME is a research network, funded by the UK research council, EPSRC, and is hosted at The University of Nottingham, led by Prof Bindi Brook and a team of international experts. BIOREME breaks down barriers to clinical translation of *in silico* respiratory medicine through their commitment to interdisciplinary collaboration and cutting-edge research. BIOREME is dedicated to advancing respiratory medicine and improving lung health by fostering a collaborative international network of professionals across academia, medicine, industry, and charity. Their expertise lies in leveraging expertise in the mathematical sciences to catalyse innovative research that addresses key priorities for lung health.

BIOREME's approach is to foster collaboration across disciplines and sectors to catalyse new interdisciplinary research partnerships. BIOREME leads a series of initiatives that focus on 4 priority areas where there is great potential for collaborative and translational research to be transformative to patient health in respiratory medicine; improving clinical trial design, next generation lung function measurement, pulmonary mechanics in critical and chronic care and environmental determinants of lung health.

As a partner of the Avicenna Alliance, BIOREME plays a vital role in promoting and advancing the use of *in silico* methods in the biomedical industry. The network contributes significantly to the Alliance's mission to drive innovation in healthcare by providing insights and expertise in computational modeling. Through its participation in key working groups, BIOREME helps shape policies and standards that facilitate the adoption of these advanced technologies across the life sciences sector.

BIOREME's vibrant platform has supercharged innovation of *in silico* technologies for respiratory medicine and contributes to the creation of a more sustainable and patient-centered healthcare system.

Prestigious webinar

"*In Silico* Medicine: The Story So Far" - Prof. Marco Viceconti

There is no need to introduce Professor Marco Viceconti, one of the pioneers and founders of the existing *in silico* community. After all the time he has generously given to each and every one of us during his magnificent career, at the VPH 2024 conference, we were moved by Marco's 'Goodbye' speech at the gala dinner.

On **January 14, 2025, 5PM CET – 11 AM Eastern,** we'll be delighted to welcome Professor Viceconti for an exceptional Avicenna webinar, during which Marco will look back on his 40-year career, give advice on how best to use the *in silico* approach and suggest interesting avenues for future generations.

Abstract:
In this webinar, Marco will review the story of *in silico* medicine, and in particular of the use of computer modelling and simulation in the development and derisking of medical products, what is sometimes referred to as "In Silico Trials". From the origins in the '60s to the Physiome project, we will review the birth of the VPH Institute and the Avicenna Alliance and how the visionary idea has developed in a thriving research subject and, more recently, in an emerging industrial sector. We will close by illustrating the SWOT analysis for the adoption of In Silico Trials by biomedical industries, recently finalised by the In Silico World consortium.

Register today

Avicenna's Webinars Series

by Roberta Maggi
Office Manager, Avicenna Alliance

Every month, The Avicenna Alliance gives the opportunity to one of its members to present their world-class research. These webinars, alternating academic and industrial speakers, are open to both the Avicenna members and non-members.

This is a unique opportunity to stay up to speed with the fast-progressing *in silico* research and development. These webinars, offering a deep dive into the amazing work by our members, may nicely complement the ongoing research that you are leading and therefore lead to new collaborations to fast-track your work.

Do not hesitate to ask for information if you are interested in contributing as speakers and, if you are not an Avicenna member yet, we will be happy to give you all the information you need to become a member and enjoy all the privileges reserved for our members, including the opportunity to present one of these webinars and gain visibility for your organization and research/project!

All 51 recordings are available in the members only area of the Avicenna website. Last webinar, held on October 8th, is also available in the public area.

For further information, please contact Roberta Maggi manager@avicenna-alliance.com.

Our future webinars

- November 12, 2024: **"Superior Spine Care with a Patient-Specific Biomechanical Digital Twin of the Spine"** by Roger Assaker from MDsim – Click here to register
- December 10, 2024: **"PyAnsys – Heart: A Python framework for LS-DYNA based heart simulations"** by Wenfeng Ye, Michel Rochette, Karim El Houari & Martijn Hoeijmakers from ANSYS Inc. – Click here to register

Our latest webinars

- October 8th, 2024: "From the Virtual Metabolic Human to Digital Metabolic Twins" by Cyrille Thinnes from NUI Galway – Watch the recording

  Metabolism, influenced by genetics, microbiome, diet, and lifestyle, is key to health and disease. The Virtual Metabolic Human (VMH, www.vmh.life) integrates resources on human and microbiome metabolism to support the development of a Digital Metabolic Twin (DMT). VMH enables constraint-based reconstruction and analysis, hosting comprehensive metabolic data for modelling and visualisation. Current expansions focus on creating personalised models to advance DMTs for real-time health insights and personalised coaching.

- September 10th, 2024: "**Integrating *In Silico* and *In Vivo* Data to Optimize Plerixafor Treatment for ARDS**" by Amichai Perlman from QuantHealth and Revital Rattenbach from 4P-Pharma – Watch the recording

  ARDS is a life-threatening condition with limited treatment options. Leveraging in silico simulations and in vivo preclinical data, this study identifies optimal patient responders. Plerixafor shows promise in reducing NETosis, particularly in intubated patients and across ARDS etiologies. Targeting a specific

subpopulation based on severity, not etiology, is crucial. Plerixafor's efficacy underscores the importance of integrating in silico and in vivo data for personalized ARDS treatment.

51 recording are available online. Learn more about what other members are doing.

Watch the recording

EU Policy and Regulatory updates by the RPP team

By the RPP Team

09.09.2024 EMA Publishes Reflection Paper on AI in Medicinal Product Lifecycle

The European Medicines Agency (EMA) has recently published a reflection paper on the integration of artificial intelligence (AI) throughout the lifecycle of medicinal products. The document outlines the potential for AI to transform the development, authorisation and post-authorisation stages, while also addressing the challenges and ethical considerations involved.
The EMA emphasises the importance of collaboration among regulators, industry, and academia as a key factor in ensuring the successful implementation of AI. It is essential that AI systems are designed to continuously learn and adapt to new data and evolving regulatory requirements, ensuring their continued effectiveness and relevance in a rapidly changing environment.

While the EMA guidelines are not legally binding, companies seeking to enter the European market and obtain marketing authorisation for their products are required to adhere to these guidelines.
The following section will provide a more detailed examination of the topic.

Drug Discovery
The application of artificial intelligence and machine learning (AI/ML) in drug discovery can have a minimal regulatory impact if suboptimal performance only affects the developer. However, when AI/ML outputs are included in regulatory submissions, they must comply with the established non-clinical development guidelines. This guarantees that the evidence supplied is robust, reliable and compliant with regulatory standards.

Non-Clinical Development
Any AI/ML applications in non-clinical development that aim to improve data analysis and interpretation, potentially replacing, reducing, and refining the use of animals, must comply with existing Standard Operating Procedures (SOPs) and the OECD Series on Principles of Good Laboratory Practice (GLP). This entails adherence to advisory documents on the application of GLP principles to computerised systems and data integrity.

Clinical Trials
Any AI/ML applications used in clinical trials must comply with the relevant Good Clinical Practice (GCP) guidelines. This is to ensure the integrity of the data collected and the safety of the participants involved. This entails furnishing exhaustive documentation pertaining to the model architecture, development logs, validation and testing data, and data processing pipelines.
Furthermore, AI/ML systems utilised for clinical management may be classified as medical devices in accordance with the MDR or IVDR. It is imperative that all relevant regulations are adhered to, including the acquisition of the requisite qualifications and classifications. It is possible that even CE-marked devices may require additional qualifications for use in clinical trials. This is to ensure the rights, safety, and well-being of subjects, as well as the integrity of trial data.

Precision Medicine
It is essential that AI/ML applications in precision medicine comply with the relevant regulatory requirements for individualised treatment. AI/ML models must be validated and their outputs should be reliable and actionable.

Compliance
Failure to comply with these provisions may result in regulatory rejection or delays in trial approval, which could have a significant impact on both the pharmaceutical and medical technology sectors.

23.10.2024 EU Budget for 2025 Prioritizes Research, Health, Education, and Climate Action

The European Parliament has presented their draft budget demanding an EU budget for 2025 that focuses on improving people's lives, boosting competitiveness, and addressing current challenges MEPs are proposing a budget of nearly €201 billion, which exceeds the European Commission's initial proposal of around €199.76 billion. This marks the first annual budget following the revision of the EU's long-term financial framework, and it reflects the growing need to address global and local challenges.

The Parliament's priorities include increasing funding for health, climate action, education and research. In particular, the budget increases support for young people through Erasmus+, agriculture and rural development, and humanitarian aid. Despite the rising costs of repaying the European Recovery Instrument (EURI), which are double what was initially forecast, MEPs emphasise that essential programmes like research and Erasmus+ should not suffer cuts.
The budget includes key proposals for additional funding of €110 million for health initiatives, €70 million for Erasmus+, €42 million to address natural disasters, and €96 million for agriculture. A further €120 million is earmarked for humanitarian aid, with a particular focus on the EU's Eastern and Southern Neighbourhood regions.
MEP Victor Negrescu emphasised that the budget is citizen-centred, with a focus on economic development and quality of life. Niclas Herbst highlighted the importance of cybersecurity and staffing for the EU's institutions.
The budget is scheduled to undergo three weeks of discussions between the Parliament and the Council with the objective of reaching an agreement that will shape the EU's investments in 2025. With over 90% of the EU budget directed at investment, this proposal is expected to stimulate growth across the Union's 27 member states.

23.10.2024 Joint motion for a resolution to revise the Medical Devices Regulation

The European Parliament has voted with a large majority to urge the European Commission to implement critical amendments to the EU Medical Device Regulation (MDR) by the first quarter of 2025. The drive for

reform is intended to tackle pressing issues in the regulation, which has been criticised for its excessive bureaucracy and impact on patient care, jobs, and innovation in the medical device sector.

MEPs Dr Peter Liese (EPP) and Dr Angelika Niebler (EPP) have welcomed this step but expressed disappointment that a full overhaul of the regulation was not scheduled. The proposal for a complete revision was unsuccessful due to opposition from the Social Democrats, Liberals, and Greens, who felt the timeline was too ambitious. Despite this setback, MEP Liese urged the Commission to accelerate work on a comprehensive review, emphasising the urgency of the situation.

MEP Niebler reiterated these concerns, emphasising the need for immediate reforms to simplify the certification process. "The current regulation is a threat to saving lives," she stated, emphasising the need for Europe to remain an attractive hub for medical device innovation.

The MDR, which introduced stricter certification requirements, has resulted in bottlenecks and product shortages, with some manufacturers even withdrawing products from the market. Industry leaders, including Pharma Deutschland and the Diagnostics Industry Association (VDGH), are calling for practical changes, such as faster certification processes, transparent costs, and the abolition of the mandatory five-year recertification cycle. These measures are regarded as vital to guaranteeing efficient, safe and innovative healthcare across Europe.

Both the Parliament and industry stakeholders are now awaiting the new EU Health Commissioner's intervention to prevent further disruptions in healthcare supply.

Recent news

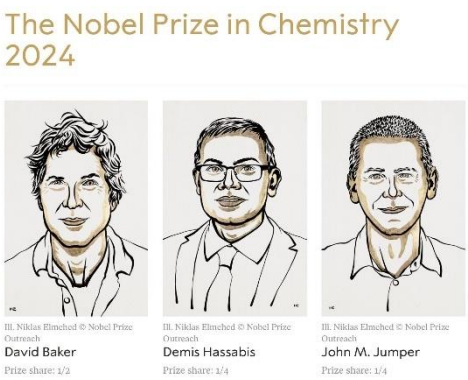
BioTechX event, Basel

The BioTechX event in Basel provided an excellent opportunity for the Avicenna Alliance to engage with key pharmaceutical players and discuss the growing role of in silico methods in drug discovery and development, drug delivery and manufacturing.
Thierry Marchal, President and Secretary General of the Alliance, delivered a presentation on the different levels of digital twins and their progressive adoption. He highlighted the successful vote in the European Parliament to reference *in silico* methods in the Global Pharmaceutical Legislation.

He also reviewed the steps involved in achieving a personal digital avatar – a digital twin for each individual, capable of predicting and, hopefully, preventing any undesirable pathologies progression.

We greatly appreciate the excellent moderation by @Galina Boldina and are very grateful for the positive feedback from @HélèneMouty, Johnson & Johnson.

Nobel Prize for in silico modelling



Congratulations to the winners of the 2024 Nobel Prize in Chemistry! This year's prestigious award honours revolutionary advancements in computational modelling, specifically in the study and design of proteins—the fundamental components of life.
David Baker from the University of Washington has used *in silico* methods to pioneer the creation of entirely novel proteins with potential applications in medicine and nanotechnology. His work opens doors to custom-designed proteins that could transform therapeutic solutions. Additionally, Demis Hassabis and John Jumper from DeepMind's AlphaFold2 project have revealed the fault lines in AI geopolitics and solved a decades-old scientific puzzle by accurately predicting the 3D structures of nearly all known proteins.

This achievement significantly enhances our understanding of biological mechanisms, aids in combating antibiotic resistance, and accelerates innovations like enzymes that break down plastics.

These breakthroughs highlight the transformative role of computational modelling in shaping the future of medicine, biotechnology, and beyond, ushering in a new era of scientific discovery and application.

Link to Official Press Release

Avicenna Alliance at IMDRF 2024 in Seattle, WA

This year's International Medical Device Regulators Forum (IMDRF) is organized by the US FDA. The fall session took place in Seattle.
As an observer to IMDRF, the Avicenna Alliance was invited to attend the open sessions and network with Regulatory Authorities, the WHO, Trade Organizations, and industry representatives from around the world. The Avicenna Alliance was represented by Mark Palmer (Ansys), who leads the IMDRF initiative for the Alliance.

Mark reconnected with many active and affiliates members to discuss the growing importance of *in silico* methods as a promising means of achieving global harmonization. The results of these discussions have been positively received by many members, reinforcing our belief that more formal steps could be taken in 2025.

PMDA, Japan, will host the IMDRF meetings in 2025.

Biomed In Silico France– CETIM, Seminar, Saint-Etienne – France, Septrember 30, 2024

The three founding members of the "Biomed in Silico France" initiative, The Avicenna Alliance, Micado, and NAFEMS organized seminar on Monday September 30, with the support of CETIM and the "Digital Health" team of CETIM St-Etienne.
The three founding members of the "Biomed in Silico France" initiative, The Avicenna Alliance, Micado, and NAFEMS organized seminar on Monday September 30, with the support of CETIM and the "Digital Health" team of CETIM St-Etienne.

Close to forty participants (R&D engineers from SME and academics) attended five extremely interesting presentations of real cases and advanced researches, confirming the significant contribution of high-performance modelling and simulation for the entire biomedical sector. Thierry Marchal discussed the emergence of *in silico* medicine for oncology.

During the round table, the representatives of the SMEs stressed the necessary help they would like to receive in implementing these new methodologies and tools.

Avicenna Alliance proudly participated in the VPH Conference 2024 in Stuttgart

We want to congratulate our VPHi partner, representing 50% of the Avicenna Alliance membership and all our academic community, and the University of Stuttgart for organizing such a successful event. It was an incredible opportunity to engage with the Virtual Physiological Human (VPH) community and numerous Avicenna industry members, discuss the latest progress in computational modelling and simulation in healthcare.
We were honoured to share our perspective during the in the VPH Panel for discussing the importance of collaboration and ecosystem for the in silico community. We had very insightful discussions with prestigious panelists: a delegate from the European Commission (Konstantin Hyppönen), a clinician

(Christian Niklas), an academic (Irene Vignon-Clementel), a patient representative (Steven (Steve) Bourke) and local health system organization (Rossana Alessandrello).

Our agenda is booked for the next VPH Conference in Milano in September 2026.

Thank You to Our Avicenna Day 2024 Speakers for a Great Success!

We would like to extend our deepest gratitude to the incredible speakers who made Avicenna Day 2024 such an enriching and inspiring event. Your expertise, insight, and passion have left a lasting impact on all who attended.
Your expert contributions helped us highlight the legacy of Avicenna while fostering discussions that bridge past wisdom with present innovation. We truly appreciate the time, knowledge, and energy you shared with us.

Thank you for making this year's event such a great success. We look forward to continuing the journey of learning and discovery together in the years to come!

FIND OUT MORE ABOUT AVICENNA DAY (AAD) 2024...

The Avicenna Day (AAD) 2024

We had an excellent Avicenna Alliance Day in Stuttgart, opening the VPH 2024 conference. On September 3rd, 75 *in silico* specialists and executives gathered to discuss recent progress and reflect on the future. The Avicenna Alliance is truly becoming a communication platform where all healthcare players feel comfortable to discuss in a very constructive way in order to bring better and safer solutions to patients faster.
We were pleased to see that clinicians, standards organisations and regulators are keen to embrace in silico methods and engage with academics and industry to carefully evolve the current regulatory approval process. We were all driven by the same goal: Bringing better, safer and more affordable treatments to patients faster.

Better and ongoing communication, particularly with clinicians and regulators, and the multiplication of standards were identified as essential steps on our ambitious but very important journey.

We are very grateful to

- Our Masters of Ceremony: Shiny Martis, Martha De Cunha, Marc Horner and Alex Frangi
- Our speakers and panelists: Simon Sonntag, Nishant Ravikumar, Roger Assaker, Erica Beaucage-Gauvreau, Luca Emili, Rene Bombien, Klaus Zeier, Payman Afshari, Matthieu Chareyre, Nirnith Devireddy, Philippe Favre, Mark Palmer, Amin Rostami, Jan Hertwig and Jean Colombel
- Our hosts: Roberta Maggi and Thierry Marchal

Join us at the AAD 2024 Executive Roundtable!

This exclusive event brings together top decision-makers from leading software, medical device, pharmaceutical industries, and pioneering startups.
Together, we'll delve into the current adoption of *in silico* methods, explore the barriers to broader deployment, and share strategies to accelerate medical innovation for the patient.

Discover how *in silico* methods are shaping the future of healthcare, and learn what tactics executives are developing to create safer, better, and more affordable healthcare for all.

Don’t miss out on this chance to be at the forefront of tomorrow’s healthcare revolution!

Members Corner

Events

BIOREME Mathematical study group in Quantitative Systems Pharmacology in Respiratory Medicine
University of Nottingham: 07/04/2025 - 11/04/2025

BIOREME is hosting its third study group in collaboration with the UK Quantitative Systems Pharmacology (QSP) Network. They are currently welcoming challenges and enquiries from industry and clinicians. The study group provides an interface between companies, clinicians and mathematicians to develop mathematical tools to solve the problems in respiratory medicine.

Industry representatives and Clinicians are invited to submit real-world challenges to be tackled by research scientists with expertise in mathematical modelling. Challenges should be related to respiratory medicine and involve mathematical/ computational modelling.

Deadline: 1 November 2024

More info

25th ICCS International Conference on Computational Science
Singapore: 07/07/2025 - 09/07/2025

The 25th International Conference on Computational Science (ICCS) will be held next year in Singapore, from 7-9 July 2025, at Nanyang Technological University (NTU) Singapore.
ICCS is an annual event that unites researchers and scientists from core computing fields like mathematics and computer science, alongside experts from diverse applications such as physics, chemistry, life sciences, engineering, arts, and humanities.
Together, they explore challenges, discuss solutions, and shape future research in computational science. This year's theme, **"Making Complex Systems Tractable through Computational Science"** invites papers showcasing how computational science addresses today and tomorrow's complex challenges.

ICCS is welcoming proposals for Workshops

Submission deadline: 31 January 2025.

Submit your paper now

Publications

In Silico Technologies: Leading the Future of Drug Development Breakthroughs:

InSilicoTrials authored a groundbreaking work in drug development: in the evolving fields of research and healthcare, AI, ML, and biosimulation are transforming data use. *In silico* technologies play a vital role, accelerating predictive intelligence and insights, revolutionizing traditional R&D through advanced computational techniques.

Link to the paper

Other News and interesting links

Episode 5 of the VPHi "Code & Cure: Understanding Medicine" Video Series is now available

Before a drug or medical device becomes available, it must pass through rigorous pre-clinical and clinical testing to verify its safety and efficacy. This lengthy and costly process often spans several years, with just 1 in 10 drugs making it to market. However, in silico trials—computer-simulated studies using virtual populations modelled on real patient data—can accelerate this pathway. By reducing reliance on animal and human testing, these trials promote faster innovation, facilitate earlier patient access, and highlight the importance of collaboration among diverse stakeholders.

WATCH THE VIDEO

New Partnership between InSilicoTrials and AVL

AVL and InSilicoTrials have formed a strategic partnership to incorporate AVL FIRE™ M, an advanced computational fluid dynamics (CFD) tool, into the InSilicoTrials platform. This collaboration enhances InSilicoTrials' offering, bringing state-of-the-art simulation tools to healthcare, particularly benefiting pharmaceutical manufacturing through optimized process prediction, accuracy, and efficiency.

CLICK HERE FOR PRESS RELEASE

Job opportunities

University of Pompeu Fabra (UPF)

DC8– Mechano-chemo models of the knee and intervertebral disc joints, to explore the emergence of age-related risk factors of degeneration

1. Overview of the research programme:
InSilicoHealth is an innovative Doctoral Network (DN) with the ambition to train a new generation of outstanding Doctoral Candidates (DC) that will become effective translators of the rapidly evolving digital technology to tackle existing and future challenges related with healthy ageing in Europe. The research focus of this DN lies in three key domains: the brain, heart, and musculoskeletal (MSK) systems. In the realm of digital technology, InSilicoHealth specifically focuses on virtual human twin (VHT) technology to enhance our understanding of the age-related adaptive changes of the complex human body through predictive multi-scale simulations. The research methodology employs knowledge-driven models enhanced by advanced data-driven inference techniques to optimize the health potential of older individuals.

2. Individual PhD Project Information:

Host institution: Pompeu Fabra University (UPF), Spain
Supervisory team: Prof. Jerome Noailly (PhD supervisor, UPF), Prof. Ilse Jonkers (PhD co-supervisor, KU Leuven), Prof. Miguel Ángel González Ballester (PhD co-supervisor, UPF), Dr Ludovic Humbert (secondment host, 3D-Shaper).
Enrolment in Doctoral School: Enrolled in the Information and Communication Technologies (UPF) and at the Doctoral School of Biomedical Sciences (KU Leuven).

3. PhD project description:
This PhD project will focus on coupling biological regulatory network and organ finite element models to define risk factors of different rates or organ ageing in personalised models related with patient (osteoarthritis, low back pain) and population cohorts, with which UPF works. The objectives are: 1) Couple pre-existing models at UPF: chondrocyte and intervertebral disc mechano-sensitive cell regulatory networks models with finite element models of the knee joint and the intervertebral disc; 2) Personalise the shapes of the organ models by combining magnetic resonance image segmentation and mesh morphing; 3) Personalise the regulatory network initial states, based on patient BMI, age and other factors known to control low grade inflammation mediators mapped in the networks; 4) Run simulations and mine together input data for model personalization and simulated data related with network node activations that reflect nociceptive pain, pro-inflammatory cytokine activity, balance between matrix proteases and inhibitors thereof, structural proteins; 5) Define a pipeline for model assessment, based on uncertainty and consistency analyses, falsification tests against clinical cases, capacity for discrimination in clinical case-control: 6) Assess risk factors and build corresponding surrogate models.
A successful project will result in a robust pipeline for multiscale modelling that allows mechanistic explorations of pathophysiological mechanisms and risk factor predictions for age-related joint degeneration, based on interpretable biological mechanisms.

4. Planned secondments:
- KU Leuven (December year 2, 6 months): Aims to personalise the mechanical boundary conditions to be imposed on the knee joint and intervertebral disc models, based on the movement signatures investigated by DC7, and on the translation thereof into mechanical loads to be applied on the joints, through existing collections of motion capture and MSK analyses at KU Leuven (knee joint), and through existing measurements of in vivo intervertebral disc pressure under daily activities (intervertebral disc).
- 3D-Shaper Medical (May year 1, 4 months): Early secondment at 3D-Shaper Medical aims to explore robust pipelines for personalised modelling of knee joints, through machine-learning based image processing allowing advanced annotations and fast 3D modelling, out of X-rays and MRI.

5. **Essential requirements:**
    - You hold both a Bachelor's and a Master's degree in Biomedical Engineering, Biomedicine, Computer Science, Industrial Engineering, Mechanical Engineering.
    - Specialization in computational methods in biomedical engineering or biomedicine will be highly beneficial.
    - You have a keen interest in the fields of in silico medicine, digital health, and rheumatology.
    - You have proven your proficiency in English language equivalent to B2 level (Sufficient English level will be verified during the interview, if any).
    - You did not reside or carry out your main activity (work, studies, etc.) in the host institution's country for more than 12 months in the three years before 1st of January 2025.
    - You are ambitious, well organized, a team player, and have excellent communication skills.
    - You can work independently and have a critical and analytical mindset.
    - You are a pro-active and motivated person, eager to participate in network-wide training events, international mobility, and public dissemination activities.
    - Previous experience in finite element modelling, and/or medical image processing, and/or data science, and/or motion capture and analyses, are not required but considered a plus.
6. **Application requirements:**
    - Curriculum vitae.
    - Motivation Letter, including a clear indication of the preferred DC position(s) within InSilicoHealth Doctoral Network if the applicant postulates for multiple positions.
    - Academic records (grades) of both the Bachelor's and Master's degrees.
    - Two recommendation letters by two previous scientific supervisors (these people might be contacted by the Evaluation Committee of the position, if needed).

More info and application HERE

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