



Predictive models and simulations in bone regeneration: a multiscale patient-specific approach

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EDITORIAL



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The importance of a training programme for the Early Stage Researchers

Being an **Innovative Training Networks Action**, **Curabone** aims to train a new generation of creative and innovative researchers, capable of transforming knowledge and ideas into products and services for the economic and social benefit of the European Union.

The training programme of **Curabone** has been organized on the basis of high level training activities to provide the **Early Stage Researchers** with an individualized plan, supported on **multidisciplinary tools** to address more efficiently their research activity and future career: Workshops and specialized seminars to achieve the highest excellence on patient specific bone treatment, on-site training through research (secondments), own structured training courses, networking, seminars of leading researchers and complementary skills courses.

The key of CuraBone success is the coordination between the expertise and needs of **industry and academia**, and we believe that we are certainly helping to provide very valuable training opportunities to these young researchers who have so much to offer to European society.



This project has received funding from the European Union's Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie grant agreement No 722535.

International Workshop on Bone Mechanics and Tissue Engineering



The **International Workshop on Bone Mechanics and Tissue Engineering** was held in Zaragoza on February 2020 with the participation of renowned experts in this field. The two-days' workshop was a great success in terms of participation: five speakers from different universities presented the state-of-the-art in this field to 50 people from all over Europe in the following conferences:

- **José Manuel García Aznar** (University of Zaragoza): Scaffold design in Bone Tissue Engineering: Towards the creation of subject-specific models.
- **Gwendolen Reilly** (The University of Sheffield): Mechanobiology for bone tissue engineering. Biomaterials fabrication techniques for structural bone tissue engineering.
- **Michael Skipper Andersen** (Aalborg University): Introduction to musculoskeletal modelling. Application of musculoskeletal models within knee osteoarthritis research.
- **Bert van Rietbergen** (Eindhoven University of Technology): Analysis of bone structure, strength and remodelling in-vivo. Analysis of bone structure, strength and remodelling ex-vivo, Design Control of 3D.
- **Scott Hollister** (Georgia Institute of Technology and Emory University): Printed Scaffolds for Quality Systems. Head and Neck Hard and Soft Tissue Engineering using 3D Printed Scaffolds,

The Workshop closed with a round table: From engineering research to clinical applications, with Angel Lanas, Scientific Director of IIS Aragon.

Mentoring sessions

Our young researchers had the opportunity to share their work and receive advice from the visiting experts of the International Workshop on Bone Mechanics and Tissue Engineering held in Zaragoza the 6-7th of February 2020.

Jonathan, Maria, Gabriele and Simone presented the work they have carried out so far and their plans for the future, and they could discuss with **Scott Hollister, Gwendolen Reilly, Bert van Rietbergen and Michael Skipper Andersen**. And of course with their supervisors in the University of Zaragoza: Jose Manuel Garcia Aznar, Maria Angeles Perez Anson and Maria Jose Gomez Benito.



Gabriele Nasello



Jonathan Pitocchi



Simone Russo



Maria Hilvert

TRAINING AND DISSEMINATION

Here are some activities carried out in the first two months of 2020. Unfortunately, the current situation resulting from the expansion of the coronavirus is affecting the development of foreseen training and dissemination activities. International events, Congresses and courses are being cancelled due to the mobility and safety restrictions established by the governments of the member states of the European Union.

Talks to students by María José Gómez Benito

As a part of H2020 strategy, the dialogue between researchers and citizens has to be strengthened and empowered, and Scientists have to bring Science closer to young students.



With that goal in mind **María José Gómez Benito**, one of the fellows' supervisors from the University of Zaragoza, gave two talks to young students at **IES La Azucarera** in Zaragoza and the **Vallecas Magerit Secondary School** in Madrid on February.




She encouraged the kids to take an interest in Science, talking about mechanics and biology, the design of personalized prostheses and of course about the Curabone Project.

Talk to students at the University of Palermo, by Gabriele Nasello

Our ESR **Gabriele Nasello** gave a talk at the **University of Palermo** to the Master students of the Biomedical Engineering programme. He presented the Marie Curie Action, the European project Curabone and his own research. The title of the talk was "**A European Industrial PhD on bone tissue engineering**".



Jose Manuel García Aznar at UCL

**APPLIED BIOMECHANICS:
LECTURE SERIES IV**

Bone defects may arise due to a number of conditions such as fractures and diseases. Despite extensive research in understanding natural bone regeneration and numerous studies on bone tissue engineering, treatment of large bone defects remains a huge clinical challenge of 21st century.

Our Project Coordinator, prof. **García Aznar**, gave a lecture on **Applied Biomechanics** at the **London University College - UCL Mechanical Engineering**.

It was an opportunity to discuss the recent development of bone mechanics and regeneration.

Life on Chip



20 Feb 2020 - 21 Feb 2020
Leuven, Belgium
Life-on-Chip 2020

Our ESR Gabriele Nasello attended the 2nd '**Life-on-Chip Conference: Enabling personalized medicine through cross-over Innovation**' in Leuven (Belgium)

PUBLICATIONS AND ABSTRACTS RECENTLY SUBMITTED BY THE CURABONE STUDENTS:



David Leandro Deijtiar

Abstracts:

- **Standard cruciate-retaining total knee arthroplasty implants can reproduce native kinematics.** 20th meeting of the International Society for Computer Assisted Orthopaedic Surgery (CAOS 2020, Brest, France. June 2020).
- **Development of a cruciate-retaining total knee arthroplasty musculoskeletal model.** 26th congress of the European Society of Biomechanics (ESB 2020, Milan, Italy. July 2020).



Jonathan Pitocchi

Abstracts:

- **Stability predictions for custom shoulder implants: experimental and finite element analysis.** 26th congress of the European Society of Biomechanics (ESB 2020, Milan, Italy).
- **Automatic muscle elongation measurement during shoulder arthroplasty planning.** 20th meeting of the International Society for Computer Assisted Orthopaedic Surgery, CAOS 2020, Brest, France.

Publications:

- **Automatic muscle elongation measurement during reverse shoulder arthroplasty planning.** Jonathan Pitocchi, Katrien Plessers, Roel Wirix-Speetjens, Philippe Debber, G. Harry van Lenthe, Ilse Jonkers, M Angeles Perez, Jos vander Sloten. Journal of Shoulder and Elbow Surgery (under review)
- **Cortical bone mapping improves finite element strain prediction accuracy at the proximal femur.** E. Schileo, J. Pitocchi, C. Falcinelli, F. Taddei. Bone (under review)



Gabriele Nasello

Abstracts:

- **Microfluidic environment as minimal functional unit for primary human osteoblast differentiation.** TERMIS EU 2020 conference (Manchester, United Kingdom, May 2020).
- **Implantation site of porous scaffolds regulates the distribution of mechano-driven bone ingrowth.** 26th congress of the European Society of Biomechanics (ESB 2020, Milan, Italy. July 2020).

Publication:

- **Primary human osteoblasts cultured in a 3D microenvironment create a unique representative model of their differentiation into osteocytes.** Gabriele Nasello, Pilar Alamán-Díez, Jessica Schiavi, María Ángeles Pérez, Laoise McNamara and José Manuel García-Aznar). *Frontiers in Bioengineering and Biotechnology*, section Tissue Engineering and Regenerative Medicine. March 2020.



Simone Russo

Abstracts:

- **Lifetime prediction of pure Magnesium scaffolds: a novel approach for an in-silico degradation model.** World Biomaterials Congress 2020. (Glasgow, United Kingdom, May 2020).
- **In-vitro degradation study of hybrid polyester-based scaffolds in different culture chambers.** TERMIS EU 2020 conference (Manchester, United Kingdom, May 2020).

JOB OFFER

CuraBone is currently looking for a highly motivated **Early Stage Researcher** ESR (PhD Student) interested in working in an ambitious multidisciplinary project to work at Materialise (Belgium) and University of Zaragoza (Spain).

The selected candidate will be employed under a full time local employment contract for a maximum of **8 months** at **Materialise** (Leuven, Belgium).

APPLICANTS MUST:

- Have a master's degree in engineering (biomedical, mechanical, mathematical or computer sciences) or equivalent.
- Be passionate about innovation in medical 3D printing and (bioresorbable) implant design.
- Have a strong interest in 3D biomechanical modelling (FEA, Musculoskeletal Modelling).
- Be a born problem solver with strong analytical skills, and be able to work independently with a proactive yet critical mind-set.
- Speak Python or willing to learn this software language.
- Be fluent in English, both written and verbal.
- Have high mobility for international training in Spain (University of Zaragoza).
- Have 300 Graduate ECTS (of which at least 60 ECTS must be of Master's degree) to enrol in the PhD Programme of Biomedical Engineering at the University of Zaragoza.

MARIE CURIE EARLY STAGE RESEARCHER ELIGIBILITY CRITERIA:

- Be in the first four years of their research careers and not yet have been awarded a doctoral degree.
- Not have resided or carried out their main activity (work, studies, etc.) in Belgium for more than 12 months in the 3 years immediately prior to the start date. Short stays such as holidays and/or compulsory national service are not considered.

APPLICATIONS DEADLINE: 29/05/2020

[Materialise offer link](#)

[Euraxess offer link](#)

You can also send an e-mail to curabone@unizar.es



Leading institutions:



Universidad
Zaragoza



Partner organisations:



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