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BioTis – INSERM U1026

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Tissue Engineering and Biofabrication
Laser-Assisted Bioprinting for Tissue Engineering



Research Interests:

Laser-assisted Bioprinting (LAB) for bone regeneration

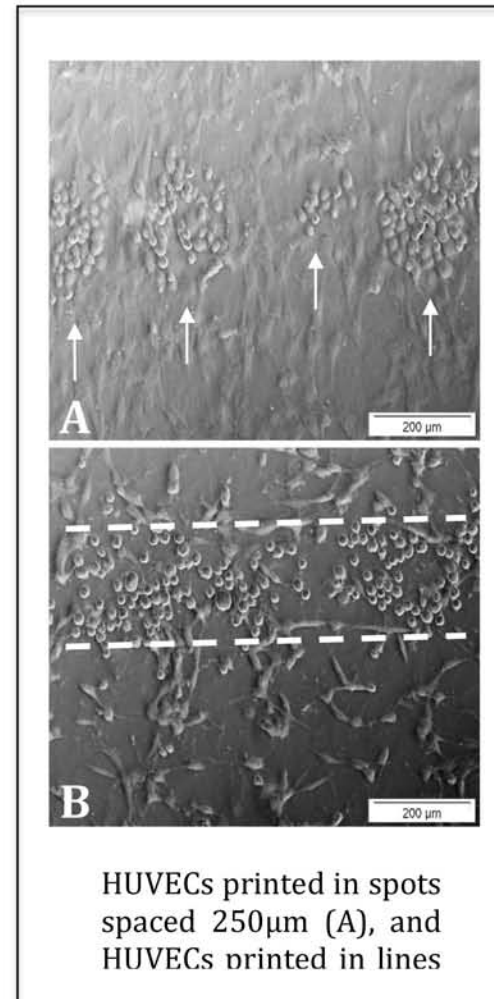
My Ph.D. is focused on the creation of organized vascular structures by Laser-assisted Bioprinting for bone regeneration.

In my clinical practice (Dental Surgery), I am often confronted with cases of large bone defects. To resolve problem of bone loss, therapeutic solutions exist, but all have limitations and risks. The development of new implantable bone substitutes by tissue engineering remains a challenge.

My work is centered on the use of coculture of endothelial cells and mesenchymal stem cells (SCAPs) to promote the formation of a vascular network. LAB technology is used to print endothelial cells with a defined and precise pattern.

LAB workstation is based on a laser ($\lambda=1064$ nm, 30 ns), focused on a quartz ribbon that was coated with a thin absorbing layer of gold and a layer of cell bioink. This technology allows the assembly and micropatterning of biomaterials and cells.

During my M.Sc., we developed two strategies to study the creation of capillary-like structures. The first method consisted in seeding endothelial cells on collagen patterns printed onto agarose. The second method consisted in a coculture obtained by printing endothelial cells patterns on collagen and mesenchymal

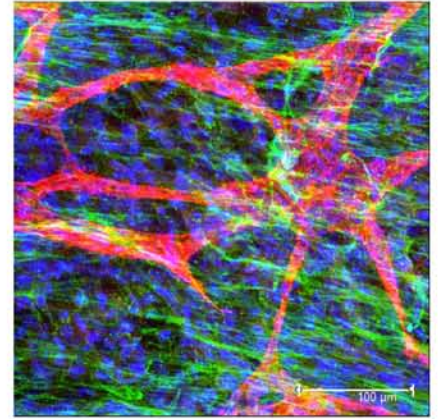


stem cells.

My Ph.D. is based on this second strategy. The objective is to promote the creation of organized vascular structures by LAB in order to optimize bone regeneration by tissue engineering.

These capillary-like structures obtained by LAB could be included into three-dimensional constructs.

In the context of my Ph.D., the perspective is to move toward *in vivo* application, by *in situ* bioprinting of endothelial cells and osteoblastic precursors onto critical-sized calvarial bone defects in mice.



Capillary-like network obtained by printing endothelial cells onto a biopaper of collagen and SCAPs.

Keywords/expertise:

- Laser-Assisted Bioprinting
- Biofabrication
- Tissue-engineering
- Human cell culture
- Endothelial progenitors
- SCAPs
- Vascularization
- Regenerative Medicine
- Cell-based therapies
- Cell patterning
- Coculture
- Collagen
- Immunofluorescence

Publications:

- 1- Devillard R, Rémy M, Kalisky J, Bourget JM, Kérourédan O, Siadous R, Bareille R, Amédée-Vilamitjana J, Chassande O, Fricain JC. In vitro assessment of a collagen/alginate composite scaffold for regenerative endodontics. *Int Endod J*. 2015 Dec 9.
- 2- Morimoto M, Kérourédan O, Gendronneau M, Shuen C, Baradaran-Heravi A, Asakura Y, Basiratnia M, Bogdanovic R, Bonneau D, Buck A, Charrow J, Cochat P, Dehaai KA, Fenkçi MS, Frange P, Fründ S, Fryssira H, Keller K, Kirmani S, Kobelka C, Kohler K, Lewis DB, Massella L, McLeod DR, Milford DV, Nobili F, Olney AH, Semerci CN, Stajic N, Stein A, Taque S, Zonana J, Lücke T, Hendson G, Bonnaure-Mallet M, Boerkoel CF. Dental abnormalities in Schimke immuno-osseous dysplasia. *J Dent Res*. 2012 Jul;91(7 Suppl):29S-37S.
- 3- Gendronneau M*, Kérourédan O*, Taque S, Sixou JL, Bonnaure-Mallet M. Dental abnormalities and preventive oral care in Schimke immuno-osseous dysplasia. *Eur Arch Paediatr Dent*. 2014 Jun;15(3):217-21.
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Teaching Activities:

Assistant professor

Université de Bordeaux, UFR Sciences Odontologiques, Bordeaux, France

Clinical Activities:

Assistant professor

CHU de Bordeaux, Service d'Odontologie et de Santé Buccale, Bordeaux, France

Memberships:

- CNEOC (Collège National des Enseignants en Odontologie Conservatrice), 2015
- SFE (Société Française d'Endodontie), 2015
- SFBD (Société Francophone des Biomatériaux Dentaire), 2015

Awards:

- 1- Meridol Award "Application of Laser-Assisted Bioprinting to periodontal bone regeneration". CNE congress, Reims, France. 2015

2- Dental Medicine Thesis Award “Schimke immuno-osseous dysplasia and Dental abnormalities”
Université Rennes I, Rennes, France. 2012

Education:

2015-today	Ph.D. in Cell Biology & Physiopathol.	Université Bordeaux, Bordeaux, France BioTis – INSERM U1026 (Pr. Fricain)
2015-today	University Diploma in Medical Education	CRAME, Université Bordeaux, Bordeaux, France
2014-15	M.Sc. in Immunol. & Cell Biology	Université Paris Nord, Paris, France BioTis - INSERM U1026 (Pr. Fricain)
2006-10	-----	Université Rennes I, Rennes, France
2013-14	Certificate in Conserv. Dentistry & Endodontics	Université Bordeaux, Bordeaux, France
2011-12	Certificate in Parodontology	Université Rennes I, Rennes, France
2005-11	Doctor of Dental Medicine	Université Rennes I, Rennes, France

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