Curriculum vitae et studiorum – BREGOLI CHIARA

studi compiuti, i titoli conseguiti, le pubblicazioni e/o i rapporti tecnici e/o i brevetti, i servizi prestati, le funzioni svolte, gli incarichi ricoperti ed ogni altra attività scientifica, professionale e didattica eventualmente esercitata **(in ordine cronologico iniziando dal titolo più recente)**

Esperienze

*descrizione del titolo : **Patient Matched Technology Designer – Biomedical Engineer***
*data inizio **04/11/2019***
*descrizione lavoro svolto: **ricostruzione vertebre, pianificazione preoperatoria per inserimento viti peduncolari, design in SolidWorks di guide spinali custom made per il corretto inserimento delle viti in accordo con la pianificazione 3D preoperatoria, stampa 3D dei dispositivi medici.***
*Sede lavorativa **Medacta International – Caste San Pietro (CH)***
*periodo di attività dal **04/11/2019** al oggi*

*descrizione del titolo : **Tesi magistrale: lacunar morphology and microcrack pattern in healhty and osteoporitc human bone***
*data inizio **01/03/2019***
svolta presso:ETH, ZURIGO, Institute of Biomechanics, Laboratory for Bone biomechanics, Prof. Muller
*periodo di attività dal **01/03/2019** al **31/07/2019***

Studi compiuti

*descrizione del titolo : **Laurea Magistrale in Ingegneria Biomedica – Biomeccanica e Biomateriali***
*valutazione: **110/110 cum laude***
*data **03/10/2019** protocollo **Reg 1019-0113***
*rilasciato da **Politecnico di Milano***
*periodo di attività dal **2017** al **2019***

*descrizione del titolo : **Diploma di Alta Scuola Politecnica** (http://www.asp-poli.it/)*
*valutazione: **Laurea with Merit***
*data **07/02/2020***
*rilasciato da **Politecnico di Milano e Politecnico di Torino***
*periodo di attività dal **2017** al **2019***

*descrizione del titolo : **Laurea Triennale in Ingegneria Biomedica*** 15/07/20
*valutazione: **110/110 cum laude***
*data **25/07/2017** protocollo **Reg 0717-0577***
*rilasciato da **Politecnico di Milano***
*periodo di attività dal **2014** al **2017***

descrizione del titolo : ***Diploma Liceo Scientifico***
valutazione: ***96/100***
data 27/06/2014 *protocollo* ***130635***
rilasciato da ***Liceo Scientifico Annibale Calini (BS)***
periodo di attività dal ***2011 al 2014***

Pubblicazioni

titolo pubblicazione : Ultra-high-resolution Micro-CT imaging and high-throughput phenotyping of individual osteocyte lacunae in human bone
autori: E. Goff, C. Bregoli, F. Buccino, R. Müller,
XIVthCongress of the International Society of Bone Morphometry23-26 Set. 2019.
(in allegato l'abstract inerente la conferenza https://conference.ifas.ufl.edu/isbm2019/tentative-agenda.html)

titolo pubblicazione : Regenerative medicine approaches for the Mammary Gland.
data 11 Dec. 2019.
autori: C.Conci, L. Bennati, C.Bregoli, F. Buccino, F. Danielli, M. Gallan, E. Gjini, M.T. Raimondi
rivista: , Journal of Tissue Engineering and Regenerative Medicine
(https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7065113/)

Progetti

Titolo: ***Tesi magistrale: lacunar morphology and microcrack pattern in healthy and osteoporitc human bone***
Tipologia progetto: Progetto di tesi
Istituzione: ETH, Zurich, Institute of Biomechanics, Laboratory for Bone Biomechanics,
Professore: Prof. Muller
Data inizio: 1/03/2019
Data fine: 31/07/2019

Titolo: Lightwave technologies for theragnostic of pancreatic tumors
Tipologia progetto: Progetto di tesi a conclusione del percorso di Alta Scuola Politecnica
Istituzione: Alta Scuola Politecnica
Professore: Prof. Saccomandi, Prof. Perrone
Data inizio: 01/07/2018
Data fine: 25/09/2019

15/07/20

Hard skills

Python, Linguaggio C, Matlab, SolidWorks, ANSYS FLUENT, CES, Mimics, MS Office

Competenze linguistiche

Italiano : madrelingua
Inglese: C1 (test TOEIC)

CODICE FISCALE – CHIARA BREGOLI

15/07/20

ULTRA-HIGH-RESOLUTION MICRO-CT IMAGING AND HIGH-THROUGHPUT PHENOTYPING OF INDIVIDUAL OSTEOCYTE LACUNAE IN HUMAN BONE

Elliott Goff[1], *Federica Buccino*[1], *Chiara Bregoli*[1] *and Ralph Müller*[1]
[1]Institute for Biomechanics, ETH Zurich, Zurich, Switzerland

The osteocyte lacunar network (LCN) is an intricately connected system within bone that allows the organ to sense mechanical loading and adapt its structure accordingly. Yet the LCN degrades with both age and disease, which leads to a corresponding reduction in mechanosensation. It is unknown how this transition occurs and we hypothesized that the shape and size of the individual lacunae play a key role in this process. Therefore, the aim of this study was to develop a method for LCN imaging in both cortical and trabecular regions of human bone using a laboratory-based ultra-high-resolution micro-computed tomography (micro-CT) system, which allows extraction of morphometric parameters such as lacunar volume (Lc.V) and lacunar surface (Lc.S) in large-scale lacunar populations analyzing hundreds of thousands of individual lacunae using fully automated, high-throughput phenotyping.

Two human female iliac crest bone hemi biopsies embedded in PMMA were machined to extract a central cylindrical core from each using a conventional lathe and a circular diamond saw (SCAN-DIA Minicut 40, SCAN-DIA GmbH & Co. KG, Hagen, Germany). Each core was designed to have a final diameter of 3.8mm to maximize the area that could be imaged and each had clearly defined regions of trabecular and cortical bone. A height of one millimeter was imaged for both trabecular and cortical regions in each sample at a nominal voxel resolution of 1.2µm with beam settings of 55kVp, 72µA, and 4W using a µCT50 imaging system (Scanco Medical, Bassersdorf, Switzerland). The complete image volume of 18.2mm^3 (3400x3400x909 voxels) was chosen in both cortical and trabecular regions for lacunar analysis. Threshold selection, segmentation, and individual object measurement was performed using a custom Python (3.7.1, Python Software Foundation, Delaware, USA) script. Thresholds of 505 mg HA/ccm and 561 mg HA/ccm were selected for the first sample's respective cortical and trabecular regions while thresholds of 478 mg HA/ccm and 634 mg HA/ccm were chosen for the cortical and trabecular regions of the second. All images were gauss filtered (σ = 0.8, support = 1) using IPL (Scanco Medical, Bassersdorf, Switzerland).

Large populations of lacunae were segmented in both cortical (n = 131,000) and trabecular (n = 17,700) regions in both biopsies. Average lacunar volume in the cortical region measured at Lc.V = 278+/-198µm^3, lacunar surface area at Lc.S = 277+/-156µm^2, and the ratio of the two parameters Lc.S/Lc.V = 1.10+/-0.23 µm^2/µm^3. Lacunae in the trabecular region measured Lc.V = 223+/-171µm^3, Lc.S = 241+/-146µm^2, and Lc.S/Lc.V = 1.16+/-0.20 µm^2/µm^3 respectively. On average Lc.V was 20% greater in cortical bone than trabecular bone, whereas Lc.S was 13% greater.

To our knowledge, this is the first study that successfully measures large-scale lacunar morphometry of hundreds of thousands of individual human osteocytes using laboratory-based ultra-high-resolution micro-CT and high-throughput phenotyping. Large-scale lacunar imaging is essential for understanding both how lacunar morphometry manifest in different bone regions and ultimately how lacunar shape influences mechanosensation of resident osteocytes.