



UNIVERSITÀ DEGLI STUDI DI MILANO

D-MEM



PhD-UNIMI

Doctorate program
Milan
EXPERIMENTAL
MEDICINE

Evaluation of the diagnostic and prognostic potential of osteoimmunology markers in patients with osteomyelitis

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Rationale and main objectives of this project

The interaction between the immune system and bone metabolism has been recognized as important for both of these systems. Various factors produced and released during immune responses greatly affect bone cells and bone metabolism. The interaction between inflammatory molecules, such as cytokines, and the bone system is defined as “osteoimmunology” (1) and osteoimmunological mediators, such as RANKL and OPG, play a fundamental role in osteoclastogenesis in physiological and pathological conditions. A deeper investigation of the relationships between these systems will improve our understanding of their biology and contribute to the discovery of new therapeutic approaches for the diseases of the two systems. The project aims to evaluate osteoimmunological markers of infection, already promising results in previous studies by the proposing group on the diagnosis of Prosthetic Joint Infection (2) (PJI: Prosthetic Joint Infection), in the clinical context of osteomyelitis, for which the approach diagnostic lacks sensitive and specific serum markers. The aim of this project is to evaluate the diagnostic and prognostic potential of a new osteoimmunological biomarker in the evaluation of osteomyelitis, and its potential application to the clinic to improve the diagnostic and prognostic capacity, in order to make any antibiotic therapy or surgical, in order to improve the diagnostic-therapeutic approach to the patient by reducing hospitalization times with an improvement in the patient's quality of life and a reduction in the economic burden on the healthcare system.

In particular, the study will focus on the diagnostic and prognostic potential of Presepsin, and to evaluate the diagnostic and prognostic potential of Presepsin in osteomyelitis, in particular by studying the inflammatory mediators involved such as inflammatory cytokines, IL-1 and TNFalpha, oxidative stress markers and comparing it with markers already used in diagnostics, such as the C-Reactive protein and Procalcitonin (PCT), SuPAR, the specific marker for TLR2 Gram positive infection and oxidative stress markers and osteoimmunological markers, such as RANKL and OPG.

Candidate specific requirements

Skills:

Molecular and cellular biology, enzyme immunoassays, real time PCR, evaluation of laboratory medicine parameters

Most relevant publications for the project:

- 1: Galliera E, Massaccesi L, de Benedetti E, Longhi E, de Toma D, Corsi Romanelli MM, Banfi G. Longitudinal evaluation of Wnt inhibitors and comparison with others serum osteoimmunological biomarkers in osteolytic bone metastasis. *J Leukoc Biol.* 2020 Aug;108(2):697-704. doi: 10.1002/JLB.1AB0120-212RR. Epub 2020 Feb 7. PMID: 32034807.
- 2: Cucchi D, Menon A, Galliera E, Messina C, Zanini B, Marazzi MG, Massaccesi L, Compagnoni R, Corsi Romanelli MM, Randelli P. A Prospective Assessment of Periprosthetic Bone Mineral Density and Osteoimmunological Biomarkers Variations After Total Knee Replacement Surgery. *J Clin Densitom.* 2019 Jan-Mar;22(1):86-95. doi: 10.1016/j.jocd.2018.05.039. Epub 2018 May 26. Erratum in: *J Clin Densitom.* 2019 Aug 13;: PMID: 30072203.
- 3: Galliera E, Marazzi MG, Vianello E, Drago L, Luzzati A, Bendinelli P, Maroni P, Tacchini L, Desiderio MA, Corsi Romanelli MM. Circulating sRAGE in the diagnosis of osteolytic bone metastasis. *J Biol Regul Homeost Agents.* 2016 Oct- Dec;30(4):1203-1208. PMID: 28078875.
- 4: Galliera E, Marazzi MG, Drago L, Banfi G, Luzzati A, Corsi Romanelli MM. Wnt signaling pathway inhibitors as promising diagnostic serum markers of osteolytic bone metastasis. *J Biol Regul Homeost Agents.* 2016 Apr-Jun;30(2):399-408. PMID: 27358126.
- 5: Massaccesi L, Ragone V, Papini N, Goi G, Corsi Romanelli MM, Galliera E. Effects of Vitamin E-Stabilized Ultra High Molecular Weight Polyethylene on Oxidative Stress Response and Osteoimmunological Response in Human Osteoblast. *Front Endocrinol (Lausanne).* 2019 Apr 3;10:203. doi: 10.3389/fendo.2019.00203. PMID: 31001202; PMCID: PMC6457167.