RESEARCH TOPIC DASMEN6

A NOVEL ARTIFICIAL INTELLIGENCE TEST FOR PREDICTION OF VERTEBRAL FRACTURES IN METASTATIC SPINES

Datascience Unit name and address
Department of Neurosurgery
IRCCS Humanitas, Rozzano

Laboratory name and address
Department of Biomedical Sciences for Health
Politecnico, Milano

Datascience Supervisor
Prof. Letterio Politi
letterio.politi@hunimed.eu
Prof. Franco Servadei
franco.servadei@hunimed.eu

Research Supervisor
Dr. Francesco Costa
francesco.costa@humanitas.it

Abstract

The aim of this project is to develop a novel multi modular databank on spine metastasis and to develop and validate an artificial intelligence based automatic software able to predict the risk of vertebral fractures in metastatic spines, based on patient-specific finite element modeling.

Metodology

Specific Aim 1: Biomechanical characterization of the tissue constituting solid tumoral lesions, conducted on metastatic tissue samples retrieved during neurosurgical procedures. Various histologic tumor types will be investigated. Quantitative correlations between the mechanical properties of the tissue and its appearance in CT imaging will be searched.

Specific Aim 2: Creation of a novel prognostic test for the estimation of the risk of metastatic vertebral fracture, based on software with a user-friendly graphical interface able to generate and run patient-specific finite element simulations of the biomechanical behavior of the vertebrae. The computer program will allow for an easy extraction of the relevant computational results, such as the vertebral compressibility and the tumor pressurization, and finally for the estimation of the risk of vertebral fracture.

Specific Aim 3: Retrospective validation of the finite element modeling framework and of the novel prognostic test based on the analysis of available CT imaging data of patients with spinal metastases, for whom the successive clinical history, including the possible occurrence of vertebral fractures, is known. Correlation of the results with SINS scores.

Expected outcomes The main outcome is the availability of the novel prognostic test, which will have the potential to be used clinically for the estimation of the risk of vertebral fracture in specific

oncologic patients, to support the selection of possible preventive strategies such as medical therapy, bracing or prophylactic surgery.

Main technical approaches
Electronic platform in Humanitas and Milano University (Politecnico) for data acquisition and elaboration.

Scientific references
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4) Galbusera F, Qian Z, Casaroli G, Bassani T, Costa F, Schlager B, Wilke HJ, 2018. Transl Oncol 11(3), 639-646.
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Type of contract
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Borsa di dottorato di € 18.000 annui lordi o forme di sostegno finanziario equivalenti.

Humanitas University
Via Rita Levi Montalcini 4
20090 Pieve Emanuele (Milano) Italy
Tel +39.02.8224.1 - Fax +39.02.8224.2394
info@hunimed.eu
Website: www.hunimed.eu
C.F. 97692990159