



## RESEARCH TOPIC MEM9

# Clinical implementation of Artificial Intelligence algorithms to automate the Total Marrow Lymph-nodes Irradiation Curriculum MEM Clinical

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### Abstract

Total Marrow Lymph-nodes Irradiation (TMI/TMLI) is a promising modern radiotherapy technique used for facilitating the donor transplant acceptance in bone marrow transplantation (BMT) patients. TMI/TMLI allows sparing non-skeletal/lymphoid structures while increasing the dose to the BM. TMI/TMLI adoption is still limited due to the difficulty in planning, that needs many days.

The aim of this project is to help in developing artificial intelligence (AI) algorithms to automate the TMI/TMLI planning procedure on candidates to BMT patients.

The PhD applicant will: (i) create a dataset for the previous patients treated in our hospital, reviewing and harmonizing the contours; (ii) support AI experts involved in the project in developing and validating AI tools; (iii) prospectively contour and compare lymph-nodes volumes delineated on Whole Body (WB)-MRI and WB-CT; (iv) prospectively validate the TMI/TMLI plans.

### Main technical approaches

Artificial Intelligence algorithms; Multi-imaging contouring (MRI/CT); Radiotherapy plan validation; Analysis of segmentation methods.



### **Scientific references**

1. Wong JY et al. Total Body Irradiation: Guidelines from the ILROG. *Int J Radiat Oncol Biol Phys.* 2018;101:521-529.
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3. Mancosu P, Navarra P, Castagna L, et al. Plan robustness in field junction region from arcs with different patient orientation in total marrow irradiation with VMAT. *Phys Med.* 2015;31:677-82.
4. Fogliata A, Reggiori G, Stravato A, et al. RapidPlan head and neck model: the objectives and possible clinical benefit. *Radiat Oncol.* 2017;12:73.
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### **Type of contract**

Scholarship of € 21.000 gross per year awarded by Istituto Clinico Humanitas. This sum is subject to IRPEF income tax and exempt from social security contributions.

For physicians registered to the professional register, contract for continuative and coordinated service of at least € 26.000 activated Istituto Clinico Humanitas. This sum is subject to IRPEF income tax.

Borsa di studio pari ad almeno € 26.000 annui lordi erogata da Istituto Clinico Humanitas. Importo soggetto a tassazione IRPEF ed esente da contribuzione previdenziale.

Per medici iscritti all'albo, contratto collaborazione coordinata e continuativa (cococo) pari ad almeno € 26.000 annui lordi attivato da Istituto Clinico Humanitas. Importo soggetto a tassazione IRPEF.