UNIVERSITÀ POLITECNICA DELLE MARCHE

Design and construction of a non-invasive device to trap magnetic nanoparticles in pancreatic cancer for a more efficient anti-tumour agent delivery

FRANCESCO PIVA

Department of Odontostomatologic and Specialized Clinical Sciences

(DISCO) - www.univpm.it

Supervisor: Prof Eng PhD Francesco Piva

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3,776 Citations. 105 Documents. 31 h-index

5 publications:
1) Effects of extremely low-frequency magnetic fields on human MDA-MB-231 breast cancer cells: proteomic characterization.
Ecotoxicol and Environmental Safety 2023. DOI: 10.1016/j.ecoenv.2023.114650
2) A 50 Hz magnetic field influences the viability of breast cancer cells 96 h after exposure
Molecular Biology Reports 2023. DOI: 10.1007/s11033-022-08069-7
3) Effects of CXCL12 isoforms in a pancreatic pre-tumour cellular model: Microarray analysis
World Journal of Gastroenterology 2021. DOI: 10.3748/wjg.v27.i15.1616
4) Predicting future cancer burden in the United States by artificial neural networks
Future Oncology 2021. DOI: 10.2217/fon-2020-0359
5) LncRNA co-expression network analysis reveals novel biomarkers for pancreatic cancer
Carcinogenesis 2018. DOI: 10.1093/carcin/bgy069

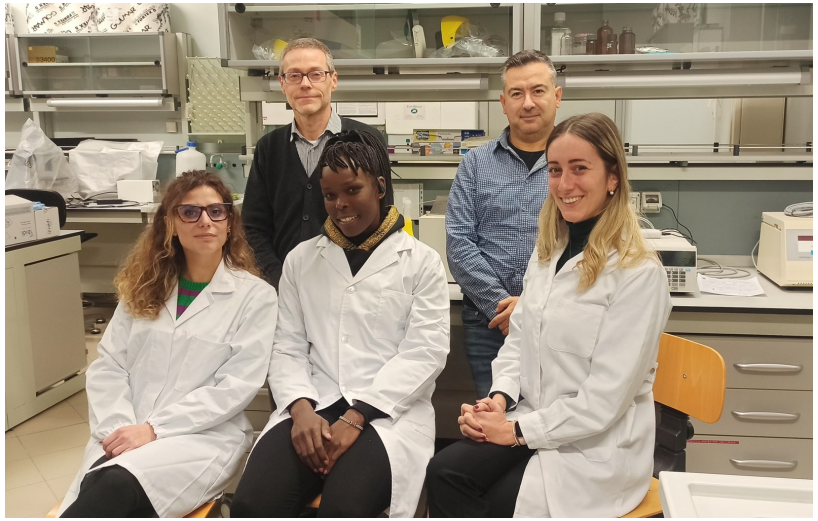
Funded projects:
- Holder of the three-year funding received from the Cariverona Foundation in 2018 for the project "CXCL12 Messengers in pancreatic ductal adenocarcinoma: Pro-tumor or anti-tumor? (IMPAcT)" (2017.0570).
- In 2018 my project “Pancreatic ductal adenocarcinoma and intercellular signals: from a prognostic approach to a treatment strategy” was funded by the Cariverona Foundation with a three-year doctoral scholarship (XXXIV cycle).
- From 2015 to 2017 I was a member of the project "Circulating tumor cells and exosomes in human pancreatic cancer. The impact on prognosis and treatment strategy" funded by AIRC (IG 2014 Id.15821).
- From 2016 to 2017 I was a member of the strategic project of the Polytechnic University of Marche "Study of biological Effects of 50 Hz electromagNetic fieldS and develOpment of a personal miniaturized dosimeteR (SENSOR)".

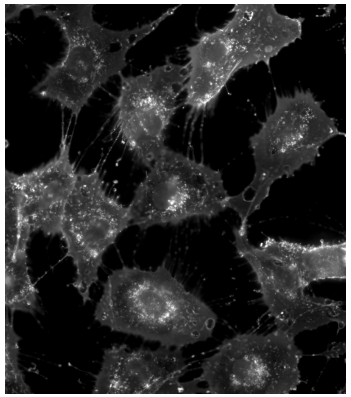
Research Group description

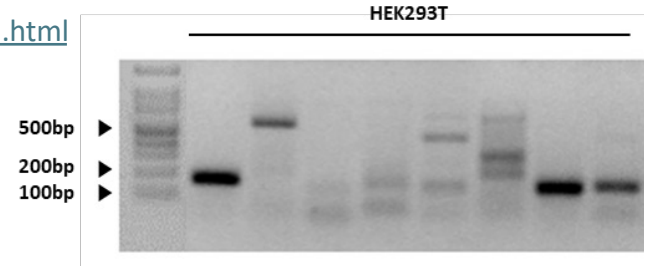
The Applied Biology research group belongs to the Departments of Specialized Clinical and Odontostomatological Sciences of the Faculty of Medicine of the Polytechnic University of Marche.

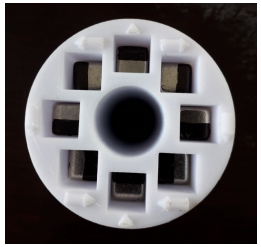
The group has been studying tumours on cellular models for many years. It has all the equipment for working with cell cultures, for molecular biology (DNA and proteins), and a modern fluorescence microscope. The group has interdisciplinary skills because it is composed of an electrical engineer and a biologist; and has published more than 100 articles in peer-reviewed journals in the fields of molecular oncology, bioinformatics and artificial intelligence.

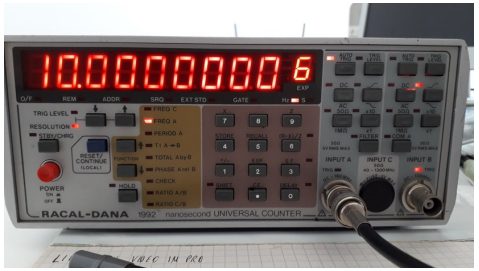
Link to the construction of a prototype for the generation of magnetic fields for biological uses:
http://www.introni.it/generatore%20campo%20elettromagnetico.html
Links to some Bioinformatics analysis programs produced by the group:
http://www.introni.it/splicing.html
http://www.introni.it/ExportAid/ExportAid.html

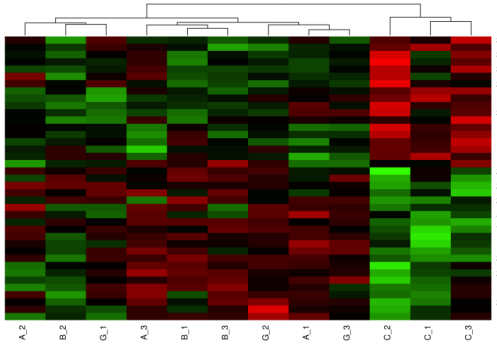


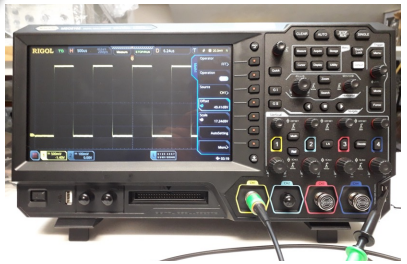












UNIVERSITÀ POLITECNICA DELLE MARCHE

Department of Odontostomatologic and Specialized Clinical Sciences

Director: Prof. Andrea Giovagnoni

The **Department of Odontostomatologic and Specialized Clinical Sciences** is the scientific and educational organizational structure of the UNIVPM University established in 2008, devoted to the promotion of scientific research, education and the dissemination of scientific research results in the community.

Its main objectives are to plan, organize and regularly evaluate the quality of research activity carried out in the scientific fields and disciplines under its competence; to plan, organize and manage the first-level and master's courses of the Faculty of Medicine; and, finally, to provide cultural and educational activities and contribute to training and orientation activities based on the needs of students in cooperation with the Medical Association.

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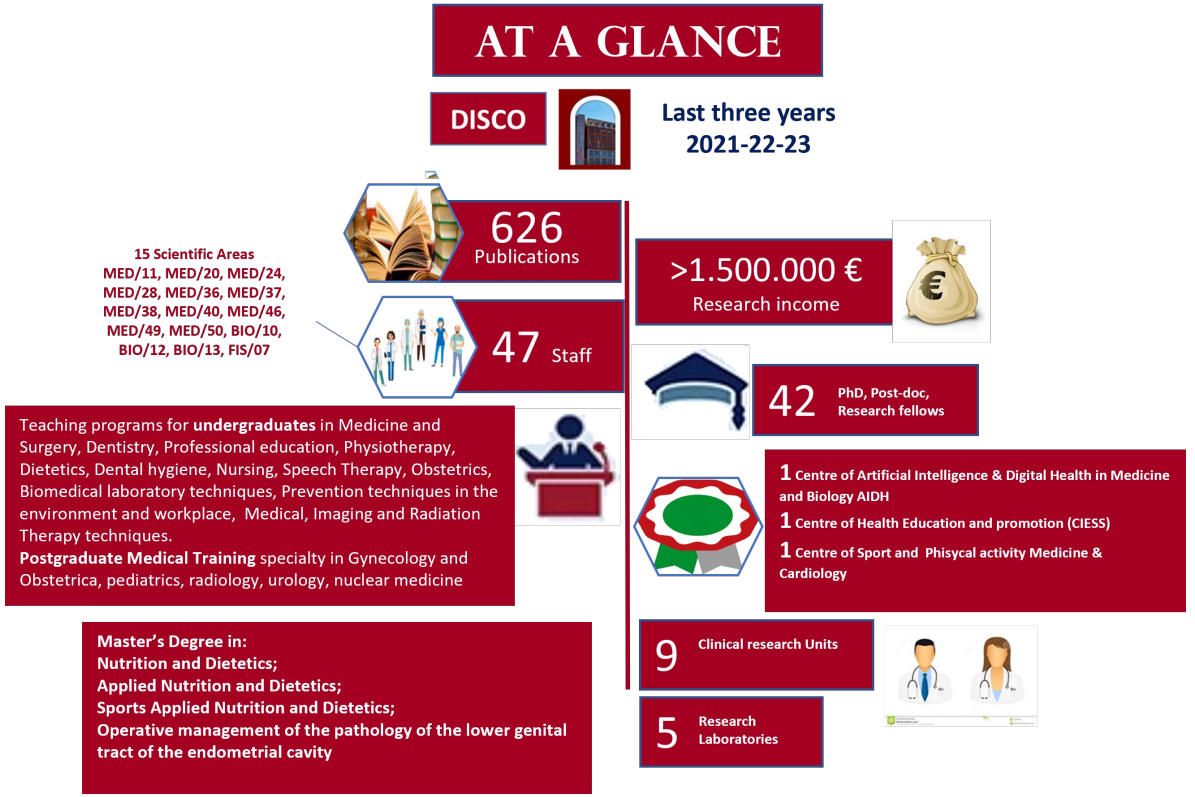
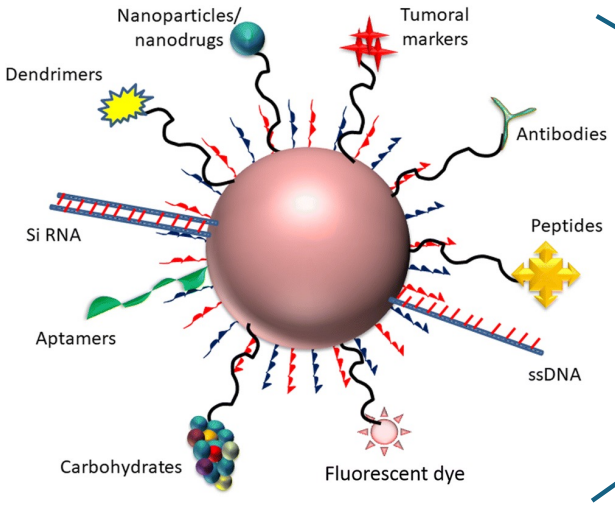
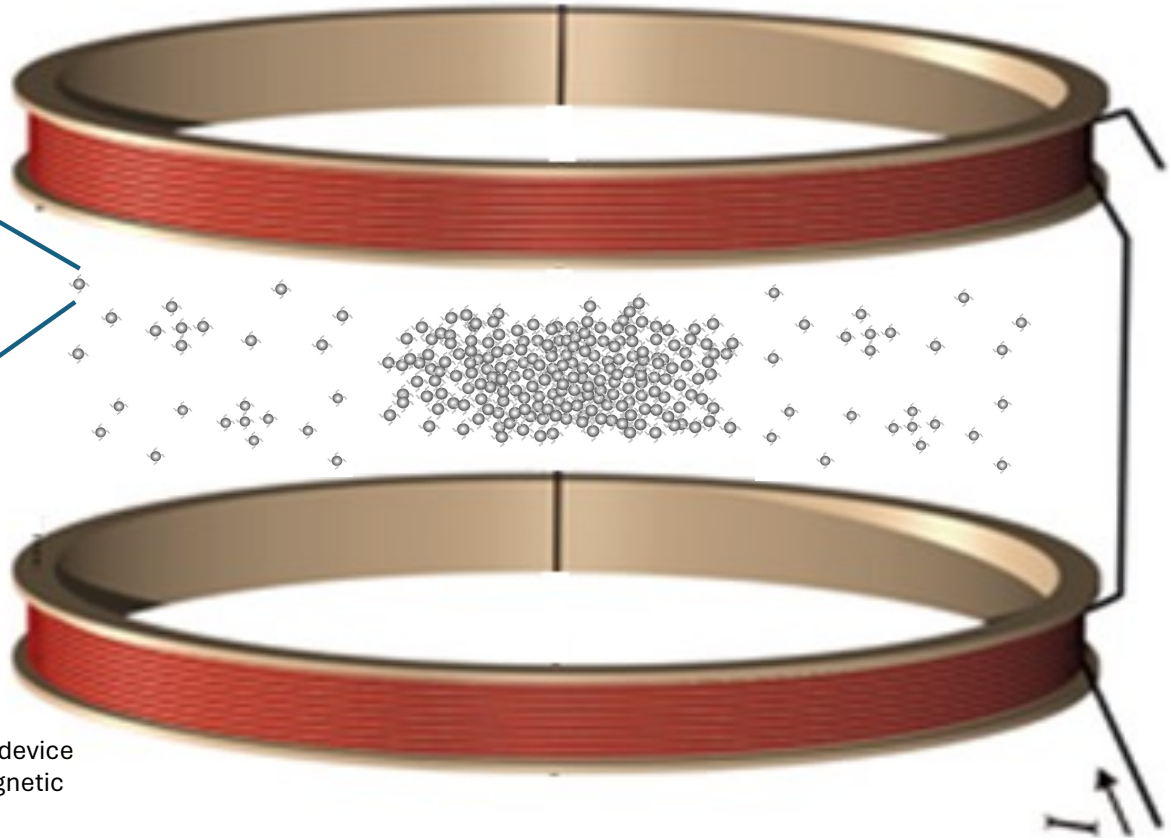


Supervisor: Prof Francesco Piva

Project idea: Design and construction of a non-invasive device to trap magnetic nanoparticles in pancreatic cancer for a more efficient anti-tumour agent delivery

Background: Anti-cancer drugs are effective in-vitro but much less in-vivo because here adequate concentrations are not achieved or cannot be reached in the diseased site. On the other hand, increasing the dose of the drug quickly causes the onset of side effects.





Project objectives:
Construction of a physical model to generate a particular magnetic field configuration in a small and confined area inside the body. Creation of the device capable of generating this type of magnetic fields. Device testing using magnetic nanospheres and a viscosity and turbulence model of the human body.