Supervisor Project Idea

Supervisor

Insert a brief CV and/or external link, the total number of publications, the ORCID link, 5 of the most significant/recent publications, and a list of funded projects and awards.

Biography: Dott. Marco Tomasetti – Researcher, PhD in Biochemistry and Biophysics, Post-graduate course in Clinical Biochemistry, Biological Science degree.
Research activity: Cancer biology and prevention. Study of cancer biology using in vitro models as such as 3D-cell culture, spheroids, organoids, patient-derived organoids, and in vivo animal models. Carcinogenesis induced by environmental and occupational exposure. Genetic and epigenetic modifications (methylation and acetylation) involved in asbestos-related diseases. Identification of biomarkers for early detection and prevention of occupational cancers, including malignant mesothelioma and sinonasal cancers. miRNA profile evaluation and identification of a tumor-specific miRNA as promising serum biomarkers for early cancer diagnosis. MicroRNA involved in cancer development and their use in therapy.
Publications N° 101
https://www.univpm.it/Entra/Docenti_1/Medicina_e_chirurgia_1/docname/idsel/995/docname/MARCO%20TOMASETTI,
ORCID
https://orcid.org/0000-0001-5036-7052,
5 of the most significant/recent publications
1. **Tomasetti M**, Monaco F, Rubini C, Rossato M, De Quattro C, Beltrami C, Sollini G, Pasquini E, Amati M, Goteri G, Santarelli L, Re M. AGO2-RIP-Seq reveals miR-34/miR-449 cluster targetome in sinonasal cancers. PLoS One. 2024;19(1):e0295997.
2. Monaco F, De Conti L, Vodret S, Zanotta N, Comar M, Manzotti S, Rubini C, Graciotti L, Fulgenzi G, Bovenzi M, Baralle M, **Tomasetti M**, Santarelli L. Force-feeding malignant mesothelioma stem-cell like with exosome-delivered miR-126 induces tumour cell killing. Transl Oncol. 2022;20:101400.
3. Re M, **Tomasetti M**, Monaco F, Amati M, Rubini C, Foschini MP, Sollini G, Gioacchini FM, Pasquini E, Santarelli L. NGS-based miRNome identifies miR-449 cluster as marker of malignant transformation of sinonasal inverted papilloma. Oral Oncol. 2021;122:105554.
4. Monaco F, Gaetani S, Alessandrini F, Tagliabracci A, Bracci M, Valentino M, Neuzil J, Amati M, Bovenzi M, **Tomasetti M**, Santarelli L. Exosomal transfer of miR-126 promotes the anti-tumour response in malignant mesothelioma: Role of miR-126 in cancer-stroma communication. Cancer Lett. 2019;463:27-36.
5. **Tomasetti M**, Re M, Monaco F, Gaetani S, Rubini C, Bertini A, Pasquini E, Bersaglieri C, Bracci M, Staffolani S, Colomba M, Gregorini A, Valentino M, Tagliabracci A, Bovenzi M, Neuzil J, Amati M, Santarelli L. MiR-126 in intestinal-type sinonasal adenocarcinomas: exosomal transfer of MiR-126 promotes anti-tumour responses. BMC Cancer. 2018;18(1):896.

list of funded projects and awards
Bando VALUE- PoC PNRR 2022 (Decreto Rettorale nr. 748/2023 del 18/07/2023)

Research Group Description

Provide the name the reference department and a brief description of the research group, including external links, and available instrumentations and infrastructures.

The Department of Clinical and Molecular Sciences provide research and teaching activity in several subject area.

The research group of Occupational Medicine is focused on the study of asbestos-induced carcinogenesis and asbestos-related diseases including lung cancer and malignant pleural mesothelioma. Recently, is involved in a PNRR project (Heal Italia) aimed to evaluate the exposome in relation to the epigenetic changes in term of DNA and RNA methylation profile and miRNA levels induced by asbestos exposure that could be translated into changes in transcriptome, proteome, and metabolome biomarkers. The group is also involved in a POC project "miRNA for the treatment of cancer, EXO-ONCO-MIR".

The research involves molecular biology techniques and cellular 'in vitro' models including 3D cell culture such as spheroids and organoids from patients. The clinic of occupational medicine provides for biological samples (serum and blood cells) of subjects previously and currently exposed to carcinogens including asbestos. In addition, the occupational medicine group closely collaborated with the clinic of Diagnosis and Therapy of Diffuse Infiltrative Pulmonary Diseases, Pleural Pulmonary Diseases and Adult Bronchiectasis, University Hospital of Marche, Ancona, who provides for biological samples such as pleural effusion, lung and pleural biopsies of patients affected by lung cancer and malignant pleural mesothelioma. Recently, has been included in 'PredicMeso platform', an international network of researchers from across the UK and worldwide interested in the study of mesothelioma (https://www.predictmeso.com).

The department is equipped for cell culture, quantitative and digital RT-PCR (qRT-PCR, dRT-PCR), NGS (Illumina), centrifuges and ultra-centrifuges, spectrometry, Cytometry, cell sorting analysis, optical-fluorescent and confocal microscopes.

Title and goals

Provide the title of the topic and a short summary of the project idea.

Title: Large-scale production of exosomes for miRNA-based cancer therapy

Tumor-suppressive miRNAs are crucial in regulating the expression of genes associated with tumor growth and progression. Restoration of tumor-suppressive miRNAs holds great therapeutic potential in cancer treatment. However, numerous key obstacles must first be cleared away to enable successful implementation to take place. The main challenge in miRNA research is developing efficient delivery mechanisms that can target specific tissues or cells to deliver miRNA. Among various carriers proposed, exosomes have gained significant attention as efficient carrier for miRNA, as they are naturally packed and commonly transported by exosomes in normal and pathological cell–cell communication. This proposal will focus on the use of exosomes as delivery of tumor suppressor miRNA in lung cancer. The miRNA loading, isolation and purification of exosomes, as well their engineering will be standardized for large production. The exosome-enriched miRNA will be used in association with an exosomal inhibitor to increase their anticancer effects. By using multidisciplinary approaches, a large-scale production of exosome carrying an onco-miRNA will be standardized and validated for clinic use. This ambitious project will overcome most of the limitations in using exosomes as carrier for miRNA delivery in the clinic practice.

Contact details (*including email address of the supervisor*)

Marco Tomasetti, Department of Clinic and Molecular Sciences, Polytechnic University of Marche, via Tronto 10A, 60126, Ancona
Tel: 071 220 6063, email: m.tomasetti@univpm.it