Monica Averna

Associate professor

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Education and Training

1999

PhD degree in Biochemistry

Identification expression and characterization of the multiple forms of rat brain calpastatin

University of Genova and Pavia - Genova - IT

1993

Degree in Biological Science

University of Genova - Genova - IT

Academic experience

From 2019

Associate professor in Biochemistry

University of Genova - Genova - IT

2016 - 2019

Researcher fixed term L.240/10 B

University of Genova - Genova - IT

2011 - 2016

Researcher fixed term L.230/2005 Moratti

University of Genova - Genova - IT

2000 - 2008

Research contract

University of Genova - Genova - IT

Research interests

Characterisation of the Ca2+-dependent proteolytic system calpain-calpastatin in mammalian tissues and cell lines; evaluation of the mechanisms for the control of the intracellular calcium dependent proteolytic system in physiological and pathological conditions. Role of the calcium-dependent proteolytic system in interaction with other protein systems, and particularly with the Cl- channel CFTR, in physiological and pathological conditions, directly analysing cells from cystic fibrosis patients. Identification of biomarkers and analysis of the pro-inflammatory role of

MMP9 in cystic fibrosis. Analysis of antioxidant polyphenolic molecules having protecive action against the cellular toxic effects caused by the alteration in intracellular calcium homeostasis.

Grants

2019-2020

Proteomic approach for the identification of new leukocytes biomarkers directly related to a restored CFTR activity following ex vivo treatment with VX-770

Italian Cystic Fibrosis Foundation - IT

FFC12/2019 50.000 euros - Pricipal investigator

2015 - 2017

Testing CFTR repair in cystic fibrosis patients carrying nonsense and channel gating mutations

Italian Cystic Fibrosis Foundation - IT

FFC29/2015 50.000 euros - Pricipal investigator

The specificity of the assay for CFTR activity is tested using two different CFTR inhibitors, CFTR-172 and PPQ-102, and downregulating CFTR (siRNA technology) in the acute monocytic leukaemia MM6 cell line, highly expressing CFTR. The outcome was confirmed also in peripheral blood leukocytes collected by venipuncture (3-5 mL), performed in different centers and by different operators. Significant differences between WT and CF peripheral blood mononuclear cells (PBMC) and purified monocytes were recorded. Of special interest were the results obtained by the HS-YFP assay performed in PBMCs of a patient carrying the G1349D/F508del mutation and taking Ivacaftor; and the results in 18 patients in a PTC clinical trial, in 7 patients taking Orkambi, in 4 patients in clinical trial with VX 770+VX 661. 14 CF patients homozygotes for S1251N mutation and treated with ivacaftor were studied (by Rotterdam researchers) and HS-YFP assay seemed to confirm the positive effect of ivacaftor. Even if several assay variables that need further optimization among partners of research project were identified, HS-YFP assay might represent a new convenient method to measure CFTR function and the effect of correctors and potentiators on defective CFTR function. It represents a further step toward a personalized medicine approach in CF.

2013 - 2014

Establishment of a semi-automated evaluation of CFTR function in blood cells for clinical applications

Italian Cystic Fibrosis Foundation - IT

FFC6/2013 40.000 euros - Pricipal investigator

We have evaluated CFTR expression by flow cytometry and CFTR function in monocytes by whole cell patch clamp technology. We have tested a new functional test based on the use of a iodine-sensitive YFP protein capable to detect differential iodine efflux in Wild Type (WT) vs Cystic Fibrosis (CF) peripheral blood mononuclear cells (PBMC). We further defined the properties of CFTR in leukocytes demonstrating that it can be detected and monitored both at the protein and functional levels . The preliminary data confirm that YFP assay can detect differences in iodine exchange among healthy and CF individuals. These results lay the basis for the measure of the effect of CFTR correctors/ potentiators on CFTR function measured in blood cells of patients in a personalized manner with a relatively simple multiwell platform assay that can be analyzed in a commonly available automated plate reader.