Molecular oncology

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Remodeling of cancer cell metabolism and its impact on therapy and outcome
Our laboratory is involved in the characterization of metabolic changes underlying cancer progression and response to therapy, with particular focus on ovarian cancer. We have shown that increased oxidative phosphorylation and altered cholesterol homeostasis. We are currently dissecting the role of accumulated metabolites in gene expression changes and in the development of immune resistance. Recently, a special attention has also been given to the crosstalk between protein synthesis and mitochondrial metabolism. To shed further light into the mechanisms of protein synthesis regulation in cancer, the role of mitochondrial protein synthesis in the assembly and function of respiratory complexes as well as the role of molecular chaperones in coupling cytosolic and mitochondrial translation in cancer cell are currently under study.

Identification and characterization of novel RNA-binding proteins (RBPs) in cellular models of ovarian and breast cancer
We have recently characterized a previously unknown RBP – named SDOS – with roles in DNA-damage response and resistance to PARP inhibitors in breast cancer models. RBPs are critical regulators of almost all hallmarks of cancer given their ability to remodel gene expression at all post-transcriptional levels. Thus, this family of proteins is emerging as a promising hotspot for targeted therapy. We are starting a new project aiming at uncovering, in an unbiased way, the RBPome of patient-derived ovarian and breast cancer cell lines before and after development of chemoresistance to identify novel RBPs playing essential role in this context.

1. Cholesterol Homeostasis Modulates Platinum Sensitivity in Human Ovarian Cancer.
Criscuolo D, Avolio R, Calice G, Laezza C, Paladino S, Navarra G, Maddalena F, Crispo F, Pagano C, Bifulco M, Landriscina M, Matassa DS, Esposito F. Cells. 2020 Mar 30;9(4):828. doi: 10.3390/cells9040828. PMID: 32235572

2. Modulation of Mitochondrial Metabolic Reprogramming and Oxidative Stress to Overcome Chemoresistance in Cancer.
Avolio R, Matassa DS, Criscuolo D, Landriscina M, Esposito F. Biomolecules. 2020 Jan 14;10(1):135. doi: 10.3390/biom10010135. PMID: 31947673

3. Protein Syndesmos is a novel RNA-binding protein that regulates primary cilia formation.
Avolio R, Järvelin AI, Mohammed S, Agliarulo I, Condelli V, Zoppoli P, Calice G, Sarnataro D, Bechara E, Tartaglia GG, Landriscina M, Castello A, Esposito F, Matassa DS. Nucleic Acids Res. 2018 Dec 14;46(22):12067-12086. doi: 10.1093/nar/gky873. PMID: 30260431

4. Oxidative metabolism drives inflammation-induced platinum resistance in human ovarian cancer.
Matassa DS, Amoroso MR, Lu H, Avolio R, Arzeni D, Procaccini C, Faicchia D, Maddalena F, Simeon V, Agliarulo I, Zanini E, Mazzoccoli C, Recchi C, Stronach E, Marone G, Gabra

H, Matarese G, Landriscina M, Esposito F. Cell Death Differ. 2016 Sep 1;23(9):1542-54. doi: 10.1038/cdd.2016.39. Epub 2016 May 20. PMID: 27206315

5. TRAP1 and the proteasome regulatory particle TBP7/Rpt3 interact in the endoplasmic reticulum and control cellular ubiquitination of specific mitochondrial proteins.
Amoroso MR, Matassa DS, Laudiero G, Egorova AV, Polishchuk RS, Maddalena F, Piscazzi A, Paladino S, Sarnataro D, Garbi C, Landriscina M, Esposito F. Cell Death Differ. 2012 Apr;19(4):592-604. doi: 10.1038/cdd.2011.128. Epub 2011 Oct 7. PMID: 21979464