



UNIVERSITÀ POLITECNICA DELLE MARCHE

Supervisor: Prof. Michele Cianci

Dept. of Agricultural, Food and Environmental
Sciences (D3A)

<https://www.d3a.univpm.it/>

March / 2026

Project idea: Exploring the role of
vitamin B3
metabolism in cancer and
inflammation



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Research Group Description – The Supervisor



Professor of Biochemistry and Structural Enzymology at the Department of Agriculture, Food and Environmental Sciences, and member of the Interdepartmental Biochemistry Lab at the Marche Polytechnic University, Ancona. Chair of Special Interest Group 6 of European Crystallographic Association (SIG-06, ECA) – Instrumentation and Experimental Techniques.

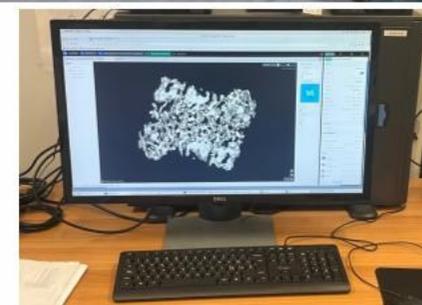
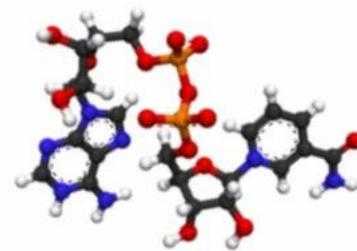
>75 peer-reviewed research articles with about 2,750 citations received, h-index = 30 according to Scopus ([ORCID](#), [CV](#)). >25 years experience in structural enzymology for biotechnological and pharmaceutical application with MX data collection and analysis at synchrotron sources and cryo-EM data analysis. Active research collaborations with national Universities (Bolzano, Bologna and Padova) and International Institutes (EMBL (Grenoble, FR), ESRF (Grenoble, FR), Elettra (Trieste, IT), ASRC (New York, U.S.).

Supervisor for >15 Bachelor and Master degrees Thesis, >5 Ph.D. students, >5 Pre- and Post-docs.

Our research has focus on how the various metabolic pathways leading to NAD biosynthesis affect the metabolic status of cancer cells, and how alteration of the intracellular NAD pool impacts on energy metabolism and inflammation. We have >5 years as academic collaborator for TES Pharma (Perugia, Italy), a company focusing on drug discovery against key targets in metabolic diseases and oncology, providing expertise in structural enzymology.

MOST RELEVANT RESEARCH SUPPORT IN RECENT YEARS

- Progetto Vitality (CUP: I33C22001330007), presentato nell'ambito dell'Avviso MUR - D.D. n. 3277/2021 - Ecosistemi dell'Innovazione - PNRR - Missione 4 Istruzione e Ricerca - Componente 2 Dalla ricerca all'impresa - Investimento 1.5, finanziato dall'Unione Europea - Next Generation EU
- Co-Principal Investigator with Prof. N. Raffaelli - Research Agreement with D3A/TESPHARMA S.r.l. (Corciano, IT) "Studio degli Enzimi della Biosintesi del NAD⁺".
- Member of research unit with Prof. N. Raffaelli. Project title: "Structure-based insights into the inflammatory functions of extracellular NAD biosynthetic enzymes" funded by Fondazione CariVerona.



MOST RELEVANT PUBLICATIONS IN RECENT YEARS

- L Sorci, M Cianci*, C Fortunato, M Gasparrini, N Raffaelli (2025). Arabidopsis thaliana nicotinate mononucleotide adenylyltransferase: unveiling the molecular determinants and evolutionary origin of nicotinic acid mononucleotide recognition. *International Journal of Biological Macromolecules*, 331,148370.
- L Mazzei, G Tria, S Ciurli, M Cianci* (2024). Exploring the conformational space of the mobile flap in *Sporosarcina pasteurii* urease by cryo-electron microscopy. *International Journal of Biological Macromolecules*, 283, 137904.
- M Cianci*, N Giacchè, L Cialabrini, A Carotti, P Liscio, E Rosatelli, F De Franco, M Gasparrini, J Robertson, A Amici, N Raffaelli, R Pellicciari (2022). The crystal structure of human dimeric α -amino- β -carboxymuconate- ϵ -semialdehyde Decarboxylase (ACMSD) in Complex with the inhibitor TES-1025. *Frontiers in Molecular Biosciences* 9, 834700.
- G Minazzato, M. Gasparrini, A. Heroux, NV Sernova, DA Rodionov, M Cianci, L Sorci, N Raffaelli (2022). Bacterial NADQ (cog4111) is an ATP- and NAD-responsive regulator of NAD biosynthesis. *Journal of Biological Chemistry*. 298, 101669.
- G Minazzato, M Gasparrini, A Amici, M Cianci, F Mazzola, G Orsomando, L Sorci, N Raffaelli (2020). Functional characterization of COG1713 (YqeK) as a novel diadenosine tetraphosphate hydrolase family. *Journal of Bacteriology*, 202, 30-35.
- DM Freire, C Gutierrez, A Garza-Garcia, ... M Cianci, TR Schneider et al. (2019). An NAD⁺ Phosphorylase Toxin Triggers Mycobacterium tuberculosis Cell Death. *Molecular Cell*, 73, 1282-1291.



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The Group, Equipment and Laboratories



The Interdepartmental Biochemistry lab (IBL) comprises biochemists, molecular biologists, bioinformatics and structural biologists from three UNIVPM departments working together to study the structure, function and dynamics of enzymes. The lab offers facilities in biochemistry and molecular biology, mammalian and bacterial cell cultures, HPLC, UV-VIS and fluorescence spectroscopy, X-ray crystallography, cryo-EM data analysis and computational modelling. In collaboration with clinical chemists, cell biologists and clinicians, we focus on identifying molecular drivers of human diseases, discovering prognostic and predictive biomarkers and novel therapeutic strategies fighting, among others, cancer and antibiotic resistance.



LAB EXPERTISE AND FACILITIES

Gene-to-Structure-to-Function



Michele
Cianci

Role of vitamin B3 in inflammation, enzymatic structure-function relationship, targeting enzymes for drug development

<https://www.d3a.univpm.it/>



Nadia
Raffaelli



Massimiliano
Gasparrini



Leonardo
Sorci

Computer based modelling of enzymes, protein-protein interactions, AI in protein science

<https://simau.univpm.it/>



Giuseppe
Orsomando

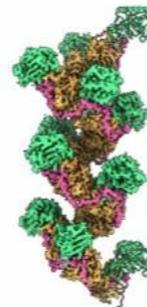
Enzymology of NAD metabolism in neurodegenerative diseases and cancer

<https://disco.univpm.it/>



Francesca
Mazzola

- gene cloning
- protein expression (in E.coli, yeasts, baculovirus mediated systems, mammalian cells)
- protein purification and crystallization
- enzymatic mechanisms
- metabolites analysis
- X-ray crystallography data collection and analysis
- cryo-EM data analysis
- bioinformatics and computing





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**Project Idea: Exploring the role of vitamin B3
metabolism in cancer and inflammation**



BACKGROUND: The coenzyme NAD is critical in cellular bioenergetics and regulatory processes. It is produced from the different forms of vitamin B3 through various metabolic pathways which are controlled by key regulatory enzymes. The enzymes controlling NAD biosynthesis (eNADBEs) from nicotinamide and nicotinic acid (NAMPT and NAPRT in the figure). Nicotinamide phosphoribosyltransferase (NAMPT) catalyzes the conversion of nicotinamide and alpha-d-5-phosphoribosyl-1-pyrophosphate pyrophosphate (PRPP) to nicotinamide mononucleotide (NMN) and inorganic pyrophosphate (PPi). NAPRT catalyzes the conversion of nicotinic acid and 5-phosphoribosyl-1-pyrophosphate (PRPP) to nicotinic acid mononucleotide (NaMN) and pyrophosphate (PPi). Unexpectedly, eNADBEs can be secreted into the extracellular space where they act as cytokines. With a still unknown mechanism, eNADBEs trigger intracellular signalling pathways that result in a wide range of different effects, like increased aggressiveness in cancer cells and proinflammatory effects in immune cells. Basal levels of circulating eNADBEs can be detected in healthy subjects, and they markedly increase in cancer and inflammatory diseases. We aim at elucidating the structural mechanisms of action of eNADBEs with the ultimate goal of controlling aggressiveness in cancer cells and the induced inflammatory response.

PROJECT OBJECTIVES:

- Set up a cellular model to elucidate the molecular mechanisms responsible of the pro-inflammatory effects of NADBEs by using the recombinant purified enzymes;
- Identify the receptor(s) of NADBEs and the triggered-signaling pathways;
- Characterize the structural interaction between NADBEs and their receptors at molecular level;
- Study the molecular and structural properties of eNADBEs to compare them with the intracellular enzymes;

