

ANTONELLA COSTANZO

Work Experience

01 November 2021 – current: Industrial Ph.D candidate in Biochemistry

Institution – Department of Biochemical Sciences “A. Rossi Fanelli”, Sapienza Università di Roma in collaboration with Takis Biotech and Institute of Molecular Biology and Pathology of National Research Council (IBPM-CNR), supported by Confindustria.

Project: Development and biochemical characterization of neutralizing antibodies against SARS-CoV2.

Main assignments & responsibilities – Protein expression in mammalian cells, purification, binding studies, crystallization, x-ray crystallography and single particle cryo electron microscopy.

29 January 2024 – 29 April 2024: Instruct- ERIC internship

Institution – Cryo EM facility of National Biotechnology Center of Consejo Superior de Investigaciones Científicas (CNB-CSIC) (Madrid, Spain)

Project – Structure of neutralising antibodies active on multiple variants in complex with the spike protein (APPID: 3098).

Main assignments & responsibilities: Cryo EM samples vitrification using vitrobot (thermofisher scientific), clipping grids, quality evaluation of vitrified grids, Cryo-EM data analysis with CryoSPARC and Scipion 3.0 software

Education and Training

Current: Industrial PhD in Biochemistry

Institution –at the Dept. of Biochemical Sciences “A. Rossi Fanelli”, Sapienza Università di Roma in collaboration with Takis Biotech and Institute of Molecular Biology and Pathology of National Research Council (IBPM-CNR).

Project: Development and biochemical characterization of neutralizing antibodies against SARS-CoV2.

Main assignments & responsibilities – Protein expression in mammalian cells, purification, binding studies, crystallization, crystallography, autonomous data collection (ELETTRA and ESRF synchrotrons), x-crystallography data analysis (CCP4 suite and phenix) single particle cryo electron microscopy.

October 2021: Master degree in Pharmaceutical Biotechnology (110 cum laude/110)

Institution - c/o Dept. of Biochemical Sciences “A. Rossi Fanelli”, Sapienza Università di Roma (Rome, Italy).

Thesis title – “Structural and functional analysis of OleP P450 against the steroid substrate lithocholic acid”

Main acquired skills and knowledge – Knowledge of the main techniques of structural biology and biochemistry (expression in *E. coli*, protein purification, X-ray crystallography, co-crystallization, autonomous data collection, x-crystallography data analysis and binding experiment).

October 2019: Bachelor degree in Applied Pharmaceutical Sciences

Institution: Sapienza Università di Roma (Rome, Italy).

Thesis title – “Role of calcium channels in regulation of neutrophil functions.”

Fundings

- November 2023 – Coordinator and Principal Investigator of 14th Instruct-ERIC Internship Call project (EUR. 3000) funded by Instruct-ERIC for the project “Structure of neutralising antibodies active on multiple variants in complex with the spike protein” (APPID: 3098).
- November 2023 – Coordinator and Principal Investigator of the “progetto per Avvio alla Ricerca - Tipo 1AR123188B0A0B47D” (EUR. 1200) funded by Sapienza University of Rome for the project “Redirecting P450 OleP regioselectivity toward C7 of testosterone by rational site-directed mutagenesis”.
- January 2024 – Principal Investigator of the Instruct ERIC Access Proposal (PID: 29835) funded by Instruct-ERIC for the project “Structure of neutralising antibodies active on multiple variants in complex with the spike protein”
- March 2024 – Principal Investigator of the iNEXT-Discovery (Tech-Sci) Access Proposal (PID: 30289) funded by iNEXT for the project “Structural basis of a promising effective antibody cocktail therapy for SARS-CoV2 variants”
- May 2024 – Principal Investigator of the Instruct Access Proposal (PID: 30541) funded by Instruct-ERIC for the project “Structure of a humanised antibody active on multiple SARS-CoV-2 variants in complex with the spike protein”

Professional Competences

Biochemistry and Biophysics. Protein expression in prokaryotic and eukaryotic cells, protein purification (affinity, anionic exchange and size exclusion chromatography).

Determination and characterization of protein 3D structure using X-ray crystallography. Basis of single particles cryo-electron microscopy (Cryo-EM) grids vitrification, sample preparation. Cryo-EM data analysis with CryoSPARC and Scipion 3.0 software

Functional characterization of proteins and enzymes using UV-visible and biolayer interferometry.

Molecular Biology. Extraction, purification, visualization and quantification of bacterial DNA, in vitro site-directed mutagenesis.

Informatics. Knowledge of Windows, MacOS and Ubuntu operative systems. Knowledge of data analysis programs (Kaleidagraph, QtiPlot), Protein structure analysis (CCP4 suite, Phenix), cryo-electron microscopy data analysis (Scipion 3.0 and CryoSparc), Protein structure visualization programs (Chimera).

Languages. Italian – mother tongue / English – B1 level



Soft skills. Competent for teamwork in an international environment. Organization and writing skills (scientific publications, funding proposals). Supervision of M.S.

Scientific Trainings and Experiences Abroad

29 January 2024 – 29 April 2024: Structural investigations of an antigen-antibody complex involved in by single-particle Cryo EM under the supervision of Dr. Rocío Arranz. and Prof. José María Valpuesta.

International Schools, Conferences and Workshops

9-13 May 2022: International conference Nanoinnovation 2024 – invited speaker “Structural and functional characterization of a humanized neutralizing antibody targeting the SARS-CoV-2 Spike RBD” (Rome, Italy) at the session Spoke 6 Rome Technopole: Joint Labs and Research Infrastructures 2/2.

23-24 May 2023: 4° AIC-BMM (Italian Association of Crystallography, Biological Macromolecules) Congress – speaker “Structural determinants of the inverted regioselectivity of the P450 OleP triple mutant F84Q/S240A/V291G toward lithocholic”. (Fiesole, Italy).

12-15 May 2023: 4 Joint AIC - SILS Conference (12-15 September 2022)” (Trieste, Italy)

11 July and 30 November 2022: Corso di BIOLOGIA E GESTIONE DEGLI ANIMALI DA LABORATORIO, MODULI 3.1, 4, 5, 6.1, 7. DM 5 AGOSTO 2021 RODITORI E LAGOMORFI - Edizione Unica, erogato in formazione a distanza

30 May and 30 November 2022: Corso di LEGISLAZIONE NAZIONALE ED ETICA LIVELLO 1, MODULI 1 E 2, DM 5 AGOSTO 2021 - Edizione Unica, erogato in formazione a distanza.

Awards and Prizes

March 2023: Laureato eccellente per l'anno accademico 2020/2021 Award - Fondazione Roma Sapienza.

Publication List

• **Costanzo, A.**; Fata, F.; Freda, I.; De Sciscio, M. L.; Gugole, E.; Bulfaro, G.; Di Renzo, M.; Barbizzi, L.; Exertier, C.; Parisi, G.; D'Abramo, M.; Vallone, B.; Savino, C.; Montemiglio, L. C. Binding of Steroid Substrates Reveals the Key to the Productive Transition of the Cytochrome P450 OleP. Structure 2024. <https://doi.org/10.1016/j.str.2024.06.005>.

- De Sciscio, M. L.; Nardi, A. N.; Parisi, G.; Bulfaro, G.; **Costanzo, A.**; Gugole, E.; Exertier, C.; Freda, I.; Savino, C.; Vallone, B.; Montemiglio, L. C.; D'Abramo, M. Effect of Salts on the Conformational Dynamics of the Cytochrome P450 OleP. *Molecules* 2023, 28 (2), 832. <https://doi.org/10.3390/molecules28020832>.