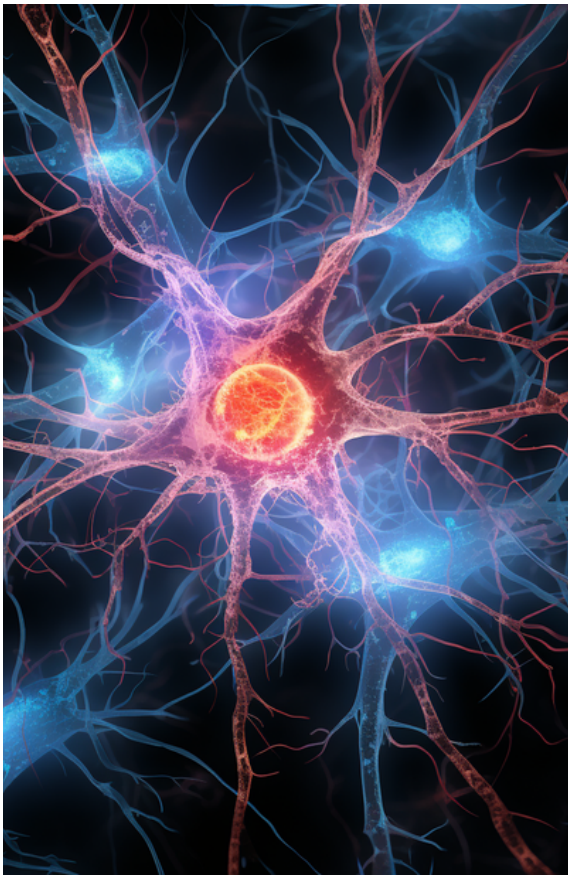
PIANO NEWSLETTER

MSCA - ITN - PIANO | GA 956477

Jan/ 2024 Vol. 5



IN THIS ISSUE

Imagination is more important than knowledge. For knowledge is limited, whereas imagination embraces the entire world, stimulating progress, giving birth to evolution.

Albert Einstein

TRAINING EVENT 4

WHEN

09 November 2023

WHERE

Microsoft Teams (Online)

TRAINING EVENT #4 - 09.11.2023

SC6. Chronic pain "omics" and target identification.
SC7. Computational modelling of nociceptive signalling - technology teaching.
SC8. New paradigms for pain resolution.

SC7

DR. PAULO DE CASTRO AGUIAR

Understanding DRG's axonal electrophysiology with a combination of in silico and in vitro tools

Paulo de Castro Aguiar received his degree in Physics (BSc+MSc) from Instituto Superior Tecnico (IST), Technical University of Lisbon, Portugal, he joined the Biophysics and Biomedical Engineering Institute (IBEB), Faculty of Sciences of Lisbon, where he spent one year studying Biophysics. In 2006, he received his PhD from the Institute for Adaptive and Neural Computation (ANC), University of Edinburgh, United Kingdom. He then returned to Portugal and joined the Neurobiology Division at the Institute for Molecular and Cellular Biology (IBMC) as a postdoc for a period of two years. In 2008, he received a position of Assistant Researcher and Lecturer in Biomathematics at the Centre for Mathematics of University of Porto (CMUP). Recently (2014), he joined the National Institute of Biomedical Engineering (INEB) as a Research Fellow. He is also a Professor Afiliado of the Faculty of Medicine of University of Porto (FMUP) and an Associated Member of CMUP.

SC8

DR. NIELS EIJKELKAMP

Positive energy: How the immune system helps to resolve pain

Niels Eijkelkamp is a leading researcher and Principal Investigator at the Laboratory of Translational Immunology in UMC Utrecht. His work focuses on a critical health issue that affects a significant portion of our population: chronic pain. Niels is committed to advancing our understanding of chronic pain and finding innovative treatments. His research is at the forefront of the field as he delves into the complex interactions between the immune system and the nervous system in the context of chronic pain. Notably, Niels' work is unique in the Netherlands, where he leads one of the very few groups dedicated to studying the underlying mechanisms of pain.

TRAINING EVENT #4

SC8

Prof. Nigel W. Bunnett

Compartmentalized Signaling of Pain

Nigel W. Bunnett Ph.D. is Professor and Chair of the Department of Molecular Pathobiology, Associate Dean for Research Development, and Investigator of the Pain Research Center, College of Dentistry, New York University. He is also a Professor in the Department of Neuroscience and Physiology and an Investigator in the Neuroscience Institute, Grossman School of Medicine, New York University. Nigel's laboratory investigates the mechanisms by which G protein-coupled receptors and receptor tyrosine kinases signal chronic pain, itch and neurogenic inflammation. A particular focus of his research is to understand how receptors signal from subcellular compartments of neurons to induce the transition from acute (physiological) to chronic (pathological) pain.

SC6

Prof. Theodore Price

Molecular mechanisms of neuropathic pain, insights from human dorsal root ganglion single cell and spatial sequencing

Theodore John Price is an Associate Professor at the School of Behavior and Brain Sciences of the University of Texas in Dallas. He received his PhD in pharmacology from the UT Health Science Center at San Antonio. After completing his doctoral studies, he was awarded a post-doctoral fellowship at McGill University in Montreal, where he investigated how the modulation of local protein synthesis in neurons is affected in chronic pain. Price continued his research in the pain field at the University of Arizona where he focused on how the nervous system responds and adapts to pain-related information. In 2014 Price returned to the University of Texas and became professor in 2018. His research has contributed to the identification of new targets for the development of safe and effective drugs for the treatment of chronic pain.

Organizing Committee:

Antonio Ferrer-Montiel (UMH)

Marc Vendrell (EDIN), Marzia Malcangio (KCL), Lynda Zeboudj (KCL)

ABOUT PIANO TRAINING EVENT 4

By ESR Board

The fourth training event concluded with great success. In November 2023, the Early Stage Researchers (ESRs) convened for an extensive exploration of pain biology in a full-day online session. This collaborative initiative, orchestrated jointly by the PIANO coordinators and beneficiaries, proved to be an invaluable platform for knowledge exchange.

ESRs had the privilege of engaging with eminent scientists from around the globe, delving into three pivotal topics: SC7 - Computational Modelling of Nociceptive Signalling Technology Teaching, SC8 - New Paradigms for Pain Resolution, and SC6 - Chronic Pain "Omics" and Target Identification.

To elucidate the intricacies of computational modelling in nociceptive signalling, ESR9 facilitated an illuminating session with Professor Paulo de Castro Aguiar from the University of Porto in Portugal. Professor Castro's expertise in utilizing in vitro and in silico systems provided a comprehensive understanding of neuronal activity prediction. The session elucidated neuron electrophysiology, shedding light on how these cells encode and transmit information, emphasizing the significance of neurobiology in the context of pain studies.

Exploring new paradigms for pain resolution, ESR15 and ESR13 orchestrated a session featuring Professor Niels Eijkelkamp from UMC Utrecht in the Netherlands and Professor Nigel W. Bunnett from New York University in the USA. Professor Eijkelkamp's focus on neuro-immune interactions within pain and Professor Bunnett's decades-long work in the pain field, particularly in understanding the transition from acute to chronic pain via neuronal receptors, provided invaluable insights. Professor Bunnett's remarkable advancements in engineering nanoparticles for chronic pain alleviation in animal models captivated the ESRs, showcasing groundbreaking applications in pain management.

In pursuit of understanding chronic pain "omics" and target identification, ESR6 hosted Professor Theodore Price from the University of Texas in the USA. Professor Price's cutting-edge techniques in characterizing human pain-perceiving neurons offered profound insights into human dorsal root ganglia neuron subtypes, their organization, and the implications of injury-induced plastic changes in neuronal activity.

The ESRs express deep gratitude for the invaluable opportunity to interact and learn from such esteemed and eminent scientists in the field of pain research. These interactions have significantly enriched their understanding and stimulated further inquiry into the multifaceted domain of pain biology.

The ESRs extend their sincerest gratitude to the organizing committee - Professor Tracey Pirali, Professor Marzia Malcangio, and Dr. Federica Zacchin-, for facilitating these enriching days of intensive learning.

PIANO WEBINAR

organized by ESR BOARD on 30.06.2023

Gender and equality in research

Rebeca Casterton

PhD

King's college London (UK)

Rebecca Casterton completed her PhD in Neuroscience earlier this year, at the Maurice Wohl Clinical Neuroscience Institute (King's College London, United Kingdom) with the labs of Dr. Manolis Fanto and Dr. Sarah Mizielinska. Her PhD work focused on understanding how toxic proteins produced in motor neuron disease and dementia trigger cell death in neurons.

She currently continues her work in the Fanto lab as a post-doc, having recently been awarded an Alzheimer's Research UK ECR Bridge Fund programme grant to study how post-mitotic status might render neurons vulnerable to some types of cell death.

In 2018, Rebecca founded the staff & student gender equality network 'Women of the Wohl', to create a space for discussions about the challenges women and other marginalized groups face within STEM. Over the years the group has gone from strength to strength, and what started out as a one-woman effort based in one research building quickly expanded to have committee of organizers with activities reaching across different faculties at King's.

Outside of King's College London, Rebecca is also a co-host and producer of the podcast 'The Academinist', a monthly podcast about equality and feminism in STEM featuring diverse guests from a variety of fields and career stages within STEM.

ESR participation to Gender&Equality webinar held on 30.06.2023

PIANO WEBINAR

organized by ESR BOARD on 28.07.2023

Exosome-mediated crosstalk between neurons and glia in dorsal root ganglia

Vincenzo Prato
Postdoctoral researcher
University of Leeds (UK)

Vincenzo is a postdoctoral researcher in Neuroscience, at the University of Leeds, School of Biomedical Sciences. During his undergraduate internship he gained experience in the production and characterization of biopolymeric nanoparticles for drug delivery. He earned a Master's degree in Neurobiology from Sapienza University of Rome. In his Master`s thesis project, he used an ex-vivo rat preparation to investigate the modifications of synaptic transmission occurring during deep brain stimulation of the Subthalamic Nucleus, a clinical approach used for the treatment of patients with Parkinson's Disease. Vincenzo received a PhD in Molecular Pharmacology from the Heidelberg University where he worked in several projects focused on mechanotransduction, silent nociceptors, and the structure of the mechanosensitive ion channel Piezo2. He has experience in ion channels controlling or influencing the excitability and synaptic transmission of pain-sensing (nociceptive) neurons, such as Anoctamins, GABAA and voltage gated sodium channels. Vincenzo has been working in the chronic pain field for about 10 years. In his current research project, he is studying the exosome-mediated crosstalk between neurons and glia within dorsal root ganglia (DRGs), as a possible mechanism of pain modulation. He is interested in the exosome cargo of DRG exosomes and in the modulatory mechanisms of exosome release. Vincenzo is always keen to share his passion for Neuroscience, in particular for ion channels and pain research. In his spare time, he enjoys reading books, watching documentaries, playing sport, and cooking

Online webinar held on 28.07.2023

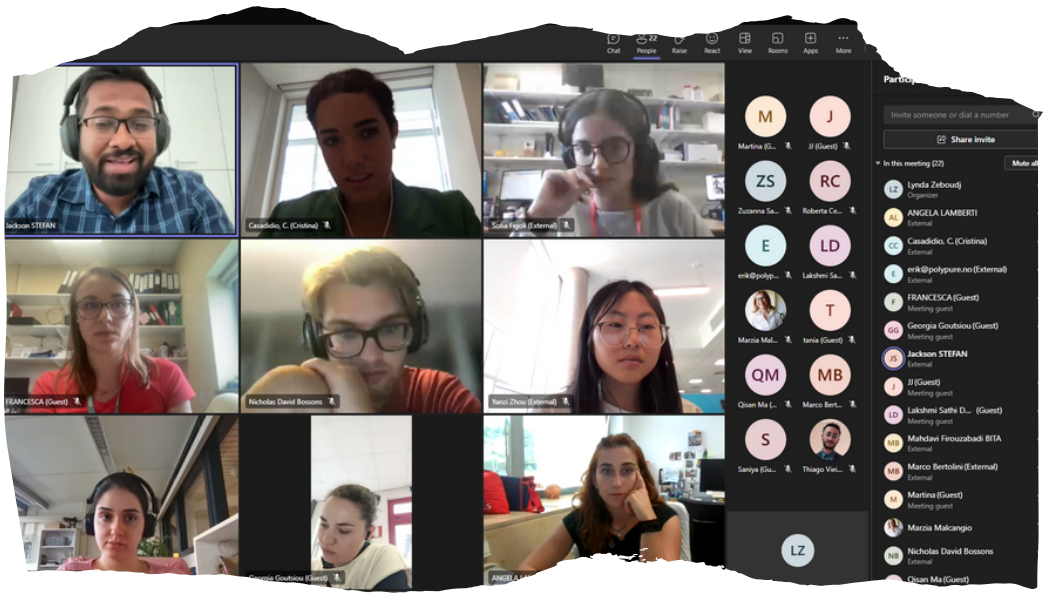
PIANO WEBINAR

organized by ESR BOARD on 18.09.2023

Injectable thermosensitive hydrogel for local and controlled delivery of siRNA polyplexes

Cristina Casadidio
Postdoctoral researcher
School of Pharmacy, Drug Delivery Division, University of Camerino (MC), Italy

Cristina is a Postdoctoral Researcher at the School of Pharmacy of the University of Camerino (IT). Her research activity is manly focused on the synthesis of multiple biopolymeric systems intended for local and controlled delivery of biotherapeutics. One of the main objectives of her work is to enhance the in vitro and in vivo stability of protein, peptides and nucleic acids (pDNA, siRNA and mRNA) exploiting different polymer chemistry and delivery systems. Infections treatment, cancer therapy and tissue regeneration represent the main pharmaceutical and medical applications of interest. She has spent the last 4/5 years as European PhD candidate following a joint project between the Department of Pharmaceutics, Utrecht Institute for Pharmaceutical Sciences (UIPS), Utrecht University (NL) and the School of Pharmacy, Drug Delivery Division, University of Camerino. Her doctoral project was under the supervision of Prof. T. Vermonden, Prof. R. Censi, Prof. P. Di Martino and Prof. W. E. Hennink.



Online webinar held on 18.09.2023

PIANO WEBINAR

organized by ESR BOARD on 10.11.2023

Investigating multicomponent reactions to access soft and hard TRPV1/CB modulators for inflammation and pain treatment

Rita Di Martino
Postdoctoral researcher
University of Eastern Piedmont, Novara, Italy.

Dr. Rita Maria Concetta Di Martino is a researcher in Medicinal Chemistry (RTD-a) at the University of Eastern Piedmont, in Novara (Italy), which she joined in 2022.

She received her Master's degree in Chemistry and Pharmaceutical Technologies at the University of Catania (Italy) in 2012 and her Europaeus Ph.D. degree in Medicinal Chemistry at the University of Bologna (Italy) in 2016. In Bologna, she worked on the naturally-inspired privileged structures as multifunctional drug candidates/chemical probes for neurodegenerative disorders (e.g., Alzheimer's and Parkinson's diseases). During her Ph.D., she also spent a training period of six months in Madrid (Spain) in the research group of Prof. Ana Martinez Gil, working on the development of brain permeable modulators of protein kinases for neurological disorders. Then, she joined the team of Prof. Andrea Cavalli at the Italian Institute of Technology in Genoa, where she has worked as a postdoctoral researcher in Medicinal Chemistry for more than 5 years. In those years, she has been involved in several computer-assisted drug discovery projects focused on the rational development of small molecules, primarily multitarget-directed ligands, to tackle complex and unmet disorders (i.e., tobacco addition, neurodegenerative tauopathies, bipolar disorder, and cancer). Since February 2022, she has been working within the research group of Prof. Tracey Pirali at University of Eastern Piedmont. Here, her research activity has been focused on the development of a platform based on multicomponent reactions (MCRs) to speed up the discovery of successful PROTACs, on the application of the soft drug approach to target NaV and TRPV1 channels for peripheral neuropathic pain, as well as to the diversity-oriented development of soft and hard TRPV1/CB modulators. She is also working on the application of deuterium (D) incorporation, a medicinal chemistry approach to improve the PK profile of marketed drugs and overcome PK/ADMET liabilities at an early development stage, along with the preclinical development of small molecules for the treatment of diseases characterized by calcium overload.

Online webinar held on 10.11.2023

ESRS' STORIES | SECONDMENT

ESR6 - Sofia Figoli

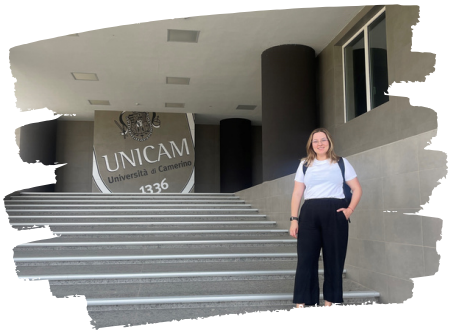
Host Institution: LEEDS | Secondment host : KCL

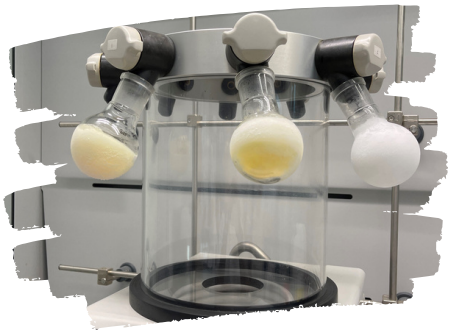
"Between July and October 2023, I had the opportunity to spend three months in the lab led by Marzia Malcangio at King's College London. Their field of research focuses on the neuro-immune interactions involved in neuropathic pain, specifically addressing the vesicle-mediated cross-talk between primary sensory neurons and macrophages. Thanks to the help of the whole team, I was able to make significant progress in my project. I've learned many new techniques including sciatic nerve surgery, Von Frey behavioral test, and flow cytometry, of which I will make great use for my future experiments. Learning to work in a different environment with diverse people is always challenging but crucial to grow as a scientist and as a person. I have to say though, that the process was eased by the team made by people who welcomed me warmly and who helped me out a lot. I'm very grateful to have had this opportunity and to have expanded my knowledge in the field of chronic pain".

ESR3 - Zuzanna Samol

Host Institution: Polypure | Secondment host: UCAM

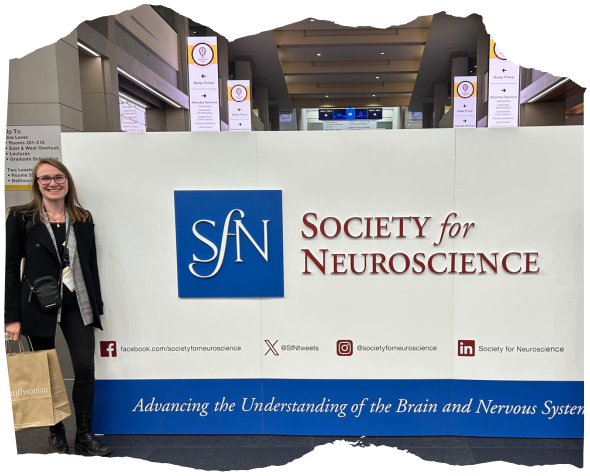
The end of 2023 for me was marked by a 1-month-long secondment at the University of Camerino in Italy. I was looking forward to learning about different hydrogel characterization methods. As well as taking a glimpse into the nanotechnology world. Besides, is there a better way of escaping the cold Norwegian winter than going to Italy? Piera Di Martino's group works at the Chemistry Interdisciplinary Project (ChiP) of the University of Camerino, focusing mainly on polymer synthesis and biomaterial development. In Camerino, I had the opportunity to get familiarized with the synthesis and characterization of PLGA nanoparticles. As well as obtain and characterize UV-crosslinked PEG-hydrogels. As an industrial PhD student, I highly valued experiencing the academic world again for these few weeks. I am grateful for the support and sharing of the expertise of Prof. Roberta Censi, Dr Cristina Casadidio, and Saniya Salathia (ESR5).

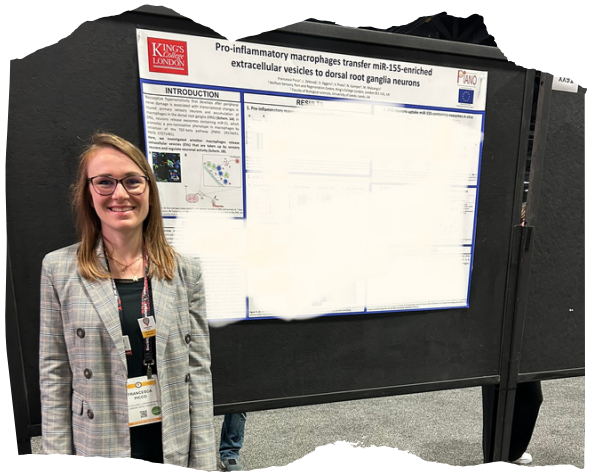




ESRS' STORIES | CONFERENCE TIME!

ESR13 - Francesca Picco - She had the opportunity to present her research at the Society For Neuroscience (SfN), on 11-15 November 2023, Washington, USA.





"For a young neuroscientist like me being part of her first SfN meeting is a rite of passage. More than 35 thousand neuroscientists gathered last November for five days in Washington D.C. to discuss top notch neuroscience and the newest discoveries in the field. I felt like a kid in a candy shop. The several seminars held by young scientists and the presidential lectures from the most eminent scientists in the field were extremely engaging and of the highest quality. I had the great opportunity to present and confront my work with brilliant neuroscientists from all over the world and to exchange ideas and points of view. My project and future career will definitely benefit from this exceptional and enriching opportunity given me by PIANO"

Francesca Picco

ESRS' STORIES | OUTREACH TIME!

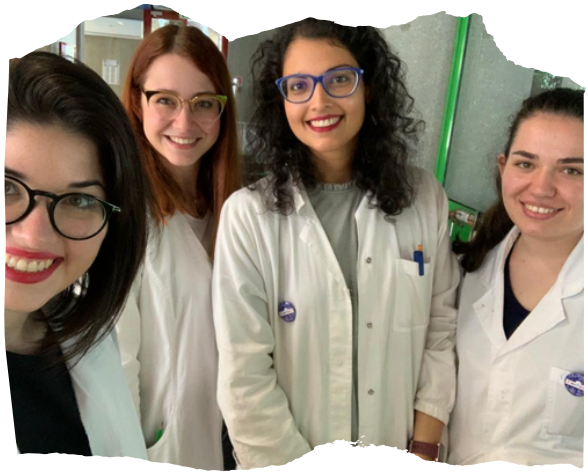
ESR9 - Angela Lamberti - She had the opportunity to participate in the European researchers' night - science gts on the 29th of September 2023. She participated with two of her colleagues and they held a small seminar for high school students showing "neurobiology with the microscope"

"Thrilling moments unfolded at the European Researcher's Night on September 29th! 🌍
I was honored to present, with my colleagues, the fascinating realm of neurobiology and sensory neurons during this exceptional event.
Through an engaging video, we illustrated how our sensory neurons dynamically respond to stimuli, aiding in our reaction to potential threats!
Yet, what truly set the day was the enthusiasm of the young scientists who joined us. 🧪🔬 Numerous curious young minds actively participating in the marvels of science was heartening!
I extend my gratitude for the privilege of sharing my passion and knowledge with the future scientists of tomorrow. 🌐 Let's persist in inspiring and empowering the scientific minds that will shape our future!"

Angela Lamberti

ESRS' STORIES | OUTREACH TIME!

ESR10 - Georgia Goutsiou - She participated to Chimicamica on the 11th and the 18th of May 2022 in Novara (Italy)



"Chimicamica is an initiative powered by Fondazione Novara Sviluppo, crafted to inject fresh inspiration and learning opportunities into the teaching practices of local primary schools, specifically within the realms of science education and introduction to the world of scientific research.
Our goal was to impart scientific knowledge by transforming science subjects into captivating topics. In this regard, this year's event was dedicated to the senses. Young students, after a short introduction to the sensational organs of the human body, had the opportunity to test their own senses through several brief experiments that the kids found really enjoyable.
Through these events, our intention was to showcase that by prioritizing an alternative educational method centered on 'let's experiment together,' we can offer children a chance to actively connect with concepts that may seem abstract in other contexts.

Georgia Goutsiou

ESRS' STORIES | OUTREACH TIME!

ESR10 - Georgia Goutsiou- She participated to The Research Week within the University of Eastern Piedmont which took place on the 30th of September 2022 in Alessandria, Italy

The Research Week stands as a valuable innovation within the University of Eastern Piedmont's array of events, serving as the culmination of numerous initiatives developed and refined over the years and various locations. In response to the increasing urgency of fostering a deeper connection between citizens and scientific culture, this week-long extravaganza serves as a singular platform, integrating a wealth of engaging activities. As we navigate the complex landscape of everyday challenges, the amalgamation of the "Children's University," PhD student presentations, and the longstanding tradition of the European Researchers' Night creates a dynamic science festival tailored for eastern Piedmont. It's a celebration of knowledge, collaboration, and the relentless pursuit of progress that defines the spirit of UPO's commitment to community engagement. My coworkers and I joined the European Researcher's Night (Notte Europea dei Ricercatori in Italia) held on September 30th in Alessandria. The theme for this year's event was "War and Peace". Following an introductory talk, citizens could engage in various activities, attend additional talks, and explore a poster session. For this occasion, we presented a set of posters focusing on Mustard gases, tracing the history of these compounds from their discovery and early battlefield use to their application as antitumor agents.

Georgia Goutsiou

PIANO PUBLICATION

Bertolini M, Wong MS, Mendive-Tapia L, Vendrell M. **Smart probes for optical imaging of T cells and screening of anti-cancer immunotherapies**. Chem Soc Rev. 2023 Aug 14;52(16):5352-5372. doi: 10.1039/d2cs00928e. PMID: 37376918; PMCID: PMC10424634.

Barth ND, Van Dalen FJ, Karmakar U, Bertolini M, Mendive-Tapia L, Kitamura T, Verdoes M, Vendrell M. **Enzyme-Activatable Chemokine Conjugates for In Vivo Targeting of Tumor-Associated Macrophages**. Angew Chem Int Ed Engl. 2022 Oct 10;61(41):e202207508. doi: 10.1002/anie.202207508. Epub 2022 Sep 5. PMID: 35993914; PMCID: PMC9826351.

Giorgi S, Lamberti A, Butrón L, Gross-Amat O, Alarcón-Alarcón D, Rodríguez-Cañas E, Fernández-Carvajal A, Ferrer-Montiel A. **Compartmentalized primary cultures of dorsal root ganglion neurons to model peripheral pathophysiological conditions.** Mol Pain. 2023 Jan-Dec;19:17448069231197102. doi: 10.1177/17448069231197102. PMID: 37578145; PMCID: PMC10521292.

FORTHCOMING EVENTS IN PIANO

PIANO Annual meeting

16-17. May 2024 - Elche (Spain)
coupled with the Final Conference

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