



UNIVERSITÀ
DI CAMERINO



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ANNEX 1 – CORSO DI DOTTORATO DI INTERESSE NAZIONALE in THEORETICAL AND APPLIED NEUROSCIENCE (borsa con sede ospitante UNICAM)

RESEARCH TOPIC

Curriculum	Code for topic	TOPIC/PROJECT
Preclinical Clinical and Translational Neuroscience	TANREG 1	Dolore cronico e neurodegenerazione: un approccio traslazionale per la comprensione dei meccanismi biologici e lo sviluppo di strategie terapeutiche innovative [EN] Chronic pain and neurodegeneration: a translational approach to understanding biological mechanisms and developing innovative therapeutic strategies



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DESCRIPTION OF TOPIC

PhD Programme: THEORETICAL AND APPLIED NEUROSCIENCE ***CURRICULUM: PRECLINICAL, CLINICAL AND TRANSLATIONAL NEUROSCIENCE***

Scholarship code: TANREG 1

Research Topic and project:

Dolore cronico e neurodegenerazione: un approccio traslazionale per la comprensione dei meccanismi biologici e lo sviluppo di strategie terapeutiche innovative

[EN] Chronic pain and neurodegeneration: a translational approach to understanding biological mechanisms and developing innovative therapeutic strategies

Research team and Environment:

This research project will be carried out in the School of Pharmacy, Center for Neuroscience, University of Camerino, Italy in collaboration with the Università Politecnica delle Marche, INRCA, QFarm S.r.l. e Biotecnica.

Neurodegenerative diseases affecting older adults, including Alzheimer's disease, represent a major source of social and healthcare costs worldwide. This issue is particularly relevant in the Marche Region, which has a high proportion of older residents. Approximately 7,000 people in the region are affected by Alzheimer's disease, while 30,000 have been diagnosed with an early-stage neurodegenerative disorder.

Chronic pain is a common and often underdiagnosed comorbidity in older adults, particularly in those with neurodegeneration and cognitive decline, and has a considerable impact on quality of life. Scientific evidence indicates that the processes underlying Alzheimer's disease progression may alter the central processing and modulation of pain. Chronic neuroinflammation, glial-cell activation, and oxidative stress appear to contribute to both neurodegeneration and the sensitization of nociceptive circuits. However, the mechanisms directly linking Alzheimer's disease to chronic pain remain poorly understood. Recent studies have identified a direct role for amyloid beta (A β), the hallmark peptide of Alzheimer's disease, in the transition from acute to chronic pain. Following nerve or tissue injury, spinal oligodendrocytes undergo metabolic reprogramming that promotes the local accumulation of A β in the spinal cord, thereby contributing to pain hypersensitivity and chronification.

The project aims to characterize the molecular and cellular mechanisms through which amyloid beta, neuroinflammation, and neurodegeneration contribute to the onset and chronification of pain. Integrating data from animal models and patients with Alzheimer's disease will facilitate the clinical translation of the findings and support the development of innovative pharmacological and nutraceutical strategies

Preferred Research Skills and Competences

The doctoral candidate will receive training in the techniques most commonly used in basic neuroscience, including brain activity recording, imaging, electrophysiology, proteomics, behavioural testing, molecular biology, histology and data analysis. Pharmacological, chemogenetic and optogenetic approaches will be also experienced. Candidates with training backgrounds in life sciences, behavioral pharmacology,



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electrophysiology, pharmaceutical sciences, molecular genetics, are preferentially considered for this position.

Supervisor: Esi Domi (esi.domi@unicam.it)

Co-supervisors: Roberto Ciccocioppo (Università degli Studi di Camerino), Mara Fabri (Università Politecnica delle Marche)

Leader of the PhD Programme: Roberto Ciccocioppo - email roberto.ciccocioppo@unicam.it

Language of the PhD Programme: Italian/English

Operative site of the PhD Student: University of Camerino, Camerino (Italy)

Exclusive participation to the project for the entire duration of the scholarship is foreseen.

Duration: **3 years**

Provisional starting date: 1st November 2026

ECTS credits (within 3 years): 180

Further info at isas.unicam.it

The Curricular related activities (seminars and courses in specific topics of interest) are organized by the Scientific Board of the PhD Programme.

Special requirements, additional to “standard” ones:

- Mandatory Period of research mobility abroad: at least 3 months up to 6 months
- Mandatory period of research and training mobility for the scope of the research topic (in Italy): period to be defined at the premises of the involved companies and/or Clusters of Marche Region
- Further aspects related to this topic must comply with the project the position is based on.