Research options available for topic B

Research topics a) and b) offered by every Doctoral Course involved in UNIPhD are frameworks within which every applicant has to present an original research project in collaboration with a Supervisor at the University of Padua.

Potential Supervisors at Unipd have proposed the following detailed research options, which are related to the research topic. They are offered as a guideline and should facilitate your contact with potential Supervisors. Supervisors' e-mail is specified in every research option table. You are welcome to contact them directly.

Note that this research option list is not at all exhaustive and, within the topic you have chosen, you are free to propose a different research project.

Doctoral Course	**PHARMACOLOGICAL SCIENCES**
Macro-area	Medical and Biomedical Sciences
Department name	Department of Pharmaceutical and Pharmacological Sciences
Webpage	*https://www.dsfarm.unipd.it/ricerca/phd-graduate-programs/phd-degree-program-pharmacological-sciences*
Research topic B	**Development of gerosuppressants and senolytic compounds for the treatment of aging and aging-related disorders** The population of high-income countries is progressively aging. Aging is associated to cardiovascular diseases, cancer, diabetes, neurodegenerative disorders. The elimination of senescent cells has been proven effective in delaying aging negative effects, but currently available drugs (senolytics) are characterized by a general toxicity. We aim to identity and develop anti-aging nutraceuticals by using both *in vitro* and *in vivo* experimental models.
Link to the UNIPhD Call (Academic Year 2022/2023)	*https://www.unipd.it/en/uniphd*
Latest Update	*12.01.2022*
#Number of available Research Options	*2* *Scroll down to see all the Research Options*

#1 Research Option Description

Doctoral Course	**Pharmacological Sciences**
Department name	Department of Pharmaceutical and Pharmacological Sciences
Research topic B	Development of gerosuppressants and senolytic compounds for the treatment of aging and aging-related disorders
Research option	Development of gerosuppressants and senolytic compounds for the treatment of aging and aging-related disorders
Supervisor	Supervisor: Andrea ALIMONTI (andrea.alimonti@unipd.it); Research group: Monica Montopoli (monica.montopoli@unipd.it)
Webpage	https://www.vimm.it/scientific-board/andrea-alimonti/
Context of the research activity and objectives	The population of high-income countries is progressively aging. Aging is associated to the development of several age-related conditions, such as cardiovascular diseases, cancer, diabetes, neurodegenerative disorders. This represents a major societal and economic burden. It is now widely accepted that treating aging as a whole, rather than single pathologies, may represent a more affordable strategy to tackle age-related disorders and increase the elderly population's health-span. For this reason, there is increasing interest in the discovery of safe and effective anti-aging drugs. Cellular senescence is a well-described physiological process involved in development of aging and aging-related disorders. The selective elimination of senescent cells has been proven effective in delaying aging negative effects, but currently available drugs (senolytics) are characterized by a general toxicity. For this reason, we perform high-throughput screenings of libraries of natural compounds, with the goal of identifying new senolytics. We have already identified a new potent senolytic hit, effective on different models of senescent cells. We aim at developing it performing its in vivo validation and the experiments needed for its translation into an effective anti-aging nutraceutical supplement.
Infrastructures	Prof. Alimonti's laboratory is located at the Veneto Institute of Molecular Medicine (VIMM). The lab has complete access to the facilities of the institute, that include: flow cytometry and cell sorters; proteomics; imaging and live imaging; electron microscopy and the high-throughput screenings are performed at the facilities of the Dept. of Biology; real-time PCR; tissue cultures facilities for primary cultures and cell lines; tissue cultures P2 facilities for retrovirus and lentiviruses productions and infections; a state of the art animal house with dedicated small animal imaging equipment and behavioural evaluation. DNA sequencing NGS is available via the core facility of the University of Padova. Prof. Alimonti leads a group (in Italy, at VIMM, and in Switzerland, at the Institute of Oncology Research, where the PhD student can spend part of its doctoral period) of 22 international fellows. Moreover, Prof. Alimonti closely cooperates with Prof. Montopoli, whose laboratory is located at the Department of Pharmaceutical and Pharmacological Sciences, and can therefore have access to the Department facilities as well.
Skills and competencies for the development of the activity	The PhD student should have a background in pharmacology and cellular and molecular biology, and a disposition to work both in vitro and in vivo.

Training offer	The PhD student will work in an international environment, in an institute with state of the art facilities. He/she will join the be-weekly virtual meetings between Alimonti's groups in Padova and in Switzerland, and periodical virtual meetings with Prof. Alimonti's national and international collaborators. The PhD student will be mentored by Dr. Sara Zumerle and Dr. Mirko Minini, two postdoctoral fellows of the Alimonti lab at VIMM. Besides, he/she will enrol in the PhD program in Pharmacological Sciences at the University of Padova. The program offers the possibility to join variety of courses and organizes journal clubs and seminars on advanced topics.
Possible Secondments	Institute of Oncology Research, Bellinzona, Switzerland, and Università della Svizzera Italiana, Lugano, Switzerland IBSA Institute Biochimique, Lugano, Switzerland

#2 Research Option Description

Doctoral Course	**Pharmacological Sciences**
Department name	Pharmaceutical and Pharmacological Sciences
Research topic B	Development of gerosuppressants and senolytic compounds for the treatment of aging and aging-related disorders
Research option	Targeting cellular senescence to avoid the NAFLD/NASH/HCC transition
Supervisor	Supervisor: Sara DE MARTIN (sara.demartin@unipd.it) Associate investigators: Daniela GABBIA, Francesco Paolo RUSSO, Maria GUIDO, Samantha SARCOGNATO, Nora CAZZAGON.
Webpage	https://www.dsfarm.unipd.it/sara-de-martin-0
Context of the research activity and objectives	In recent years, the role of cellular senescence has been intensively studied because of its involvement in both the normal aging process and several human diseases. The typical hallmarks of cellular senescence include the shortening of telomeres, enlargement of the nuclear area, and the damage of genomic and mitochondrial DNA, finally leading to irreversible cell cycle arrest and secretion of proinflammatory cytokines. The complex process of senescence is involved in the development of numerous chronic liver diseases characterized by inflammation and the increasing risk of developing hepatocellular carcinoma (HCC). Recently, both preclinical and clinical studies have confirmed the involvement of senescence in the pathogenesis and development of nonalcoholic fatty liver disease (NAFLD) and its progression to nonalcoholic steatohepatitis (NASH), which is characterized by inflammation, hepatocyte ballooning, and liver fibrosis, events which are all connected to cellular senescence as outlined above. This project aims at deepening the impact of cellular senescence in the NAFLD/NASH/HCC transition, by 1) analyzing the expression of senescence markers in different stages of the disease (NAFLD, NASH and HCC) in preclinical and clinical specimens, to ascertain whether they have a prognostic value; 2) unravelling the effect of candidate drugs under development for NAFLD/NASH and/or HCC on cellular senescence to acquire additional information on their mechanisms; 3) evaluating by in vitro and in vivo preclinical studies the effect of senolytic drugs on NAFLD, NASH and HCC.
Infrastructures	The research group has access to cell culture and cell biology labs, histology lab, real time PCR, FACS, confocal microscope, animal facility.
Skills and competencies for the development of the activity	Experience in both in vitro studies (cell culture, molecular biology techniques, cell biology techniques) and in vivo studies (development of animal models of liver diseases, ex vivo analyses).
Training offer	The PhD student will join a stimulating and multidisciplinary research group, enriched by the strict collaboration with clinical hepatologists (Francesco Paolo RUSSO and Nora CAZZAGON) and pathologists (Maria GUIDO and her staff). The PhD student will be involved in the training courses of the Doctoral Program in Pharmacological Sciences, mainly devoted to experimental and classical pharmacology (biostatistics, communicating sciences, advanced pharmacology). Seminars of scientists operating in the field will be organized on a regular basis.
Possible Secondments	MGGM Therapeutics, New York, USA. Dr. Paolo Manfredi (3 months)

	Medical University of Innsbruck, Austria. Prof. Hans Guenther Knaus (3 months)