

**RECRUITING AND TRAINING PHYSICIANS-SCIENTISTS TO EMPOWER TRANSLATIONAL RESEARCH**  
**A MULTILEVEL TRANSDISCIPLINARY APPROACH FOCUSED ON METHODOLOGY, ETHICS AND INTEGRITY IN**  
**BIOMEDICAL RESEARCH - 2018-2023**



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## RESEARCH TRAINING PROGRAM

### I. General Information

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***Title of the research project:***

Polyphenol modulation of endothelial metabolism and angiogenesis in diabetes

***Name and address of the department:***

Department of Biomedicine, Unit of Biochemistry  
Faculty of Medicine, University of Porto

***Student's supervisor:***

Raquel Costa

### II. Description of the project

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(max 1500 characters, spaces included)

***Background***

Type 2 diabetes (T2D) is a chronic metabolic disease and due to its increasing incidence, T2D will be a leading cause of morbidity and mortality in the near future. Nowadays, T2D is considered a worrisome public health challenge with excessive health care cost. Increased glycemic levels, dyslipidemia, and insulin resistance are among the factors that characterize T2D. These factors lead to alterations in micro and macrovascular beds, impaired vascular homeostasis and changes in angiogenesis, the formation of new blood vessels from pre-existing vasculature. Although it is well established that micro and macrovascular complications are features of T2D patients, the molecular mechanisms underlying the distinct vascular phenotypes remain unclear. The study of the crosstalk between angiogenesis and metabolism is of paramount importance. Epidemiological evidence show that polyphenol-rich diets protect against inflammatory, oxidative stress and angiogenic deregulated conditions. As a result of its multifunctional properties, polyphenols have emerged as promising candidates for further development to treat chronic diseases namely metabolic syndrome and T2D.

***What is the aim of the project?***

Our main goal is to study the modulatory effect of polyphenols in diabetes, metabolic deregulation and angiogenic paradox in diabetes.

***What techniques and methods are used?***

Cell culture assays;  
Cell viability, proliferation, migration and formation of capillary-like structures;  
Molecular biology assays (western blotting and RT-PCR);  
Histological analyses

***When did the department start working on this project?*** 2020

***Type of research project:***

Basic science       Clinical research without lab work       Clinical research with lab work

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### III. Student's involvement

- The student will mainly observe  YES  NO
- The student will observe the experiments but will be involved in data analysis  YES  NO
- The student will take active part in experiments ("lab work")  YES  NO
- The student will take active part in clinical examination (clinical research)  YES  NO
- The student will be allowed to work with patients  YES  NO

*What are the tasks expected to be accomplished by the student?*

Students will culture cells and treat them with distinct experimental conditions. Afterwards, they will evaluate cell viability, proliferation, migration and formation of capillary-like structures. Students will then identify some metabolic pathways by western blotting and RT-PCR.

*What is expected from/what will be the general outcome of the student?*

- To prepare a poster / presentation / scientific report / abstract
- The student will be coauthor in a future publication – if there is a scientific contribution
- Opportunity to present together with the supervisor the results on a conference
- No specific outcome is expected

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### IV. Requirements

*What skills are required from the student?*

(max 500 characters, spaces included)

In our lab the students will receive the lab safety rules and a specific guidance to the fundamental aspects of good practice to work with cell cultures.

*Is there any special knowledge or a certain level of studies needed? No.*

Subjects passed:

\_\_\_\_\_

Previous experience with:

\_\_\_\_\_

Certificate of:

\_\_\_\_\_

None

*Are there any legal limitatons in the student's involvement in the project?*  YES  NO

If yes, what are the limitations?

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*For the use of students considering participating in the project, further information can be found from the following references:*

(please add specific references, max 3)

- Raquel Costa, Ilda Rodrigues, Luísa Guardão, Joana Quelhas Lima, Emília Sousa, Raquel Soares and Rita Negrão (2017) "Modulation of VEGF signaling in a mouse model of diabetes by xanthohumol and 8-prenylaringenin: Unveiling the angiogenic paradox and metabolism interplay" *Mol Nutr Food Res* 61(4):1-12
- Lima-Fontes M, Costa R, Rodrigues I, Soares R (2017) "Xanthohumol restores hepatic glucolipid metabolism balance in type 1 diabetic wistar rats" *J Agric Food Chem* 65 (34): 7433-7439
- Raquel Costa, Ilda Rodrigues, Luísa Guardão, Sílvia Rodrigues, José Magalhães, Rita Negrão and Raquel Soares (2017) "Xanthohumol and 8-prenylaringenin ameliorate diabetic-related metabolic dysfunctions in mice" *J Nutr Biochem* 45:39-47

## V. Schedule

*Duration of the project:*

1 month     2 months     3 months

*There are approximately 3 hours of work per day.*

*Available months:*

January     February     March     April     May     June  
 July     August     September     October     November     December

*How many students can you accept to the project at the same time? 1.*

*Special remarks:*

(e.g., students should bring a stethoscope and a white coat, any vaccinations required, etc.)  
White coat.

**NOTE: a scientific report is required at the end of the program**