



Short-Term PhD Fellowship on Mathematical Modeling of Nanoparticle Penetration into Fibrous, Cellular and Tissue Barriers

Job Summary:

The position comprises a short-term, 6-month individual Early Stage Researcher fellowship within the Marie-Sklodowska Curie, ITN “PathChooser” (www.pathchooser.eu) on the development of a mathematical model for nanoparticle transport into fibrous media. The project involves application of the model to mucus tissue and to the model to the tumor interstitial space of mucus secreting malignancies

Job Description: the successful candidate is expected to be a highly motivated young researcher with prospective to be enrolled in the UCY, School of Engineering PhD program, able to work in a highly competitive environment and exposed to multidisciplinary and inter-sectoral challenges.

Tasks and methodologies of the scientific project: fundamental Properties of Nanoparticulate drugs optimized due to physicochemical characteristics imparted by nano-scale dimensions underpin mechanisms of resistance and management of delivery across cellular, biological and mechanical barriers. In this regards, nanoparticle formulation should allow for uniform distribution into the tissue they intent to target. The majority of these tissues (e.g. mucus tissue, tumor interstitial space) are composed of fibers that hinder homogeneous penetration, causing in many times only local, non-specific effects. Fiber diameter and organization might vary considerably from tissue to tissue. The tasks to be undertaken in this fellowship include:

(i) Model development and basic validation: a unified, continuum-based mathematical model will be developed that can be applied to fibrous media of varying fiber diameter and organization. Specifically, the diffusion coefficient of the particles will be calculated as a function of particle diameter and fiber diameter, concentration and organization. Subsequently, the diffusion coefficient will be used for the solution of the typical convection-diffusion equation for the transport of the nanoparticles. The solution of the convection-diffusion equation will be done with the finite elements method.

(ii) Specified barrier validation and extraction of NP design guidelines: The model will be applied to two systems, particularly underpinning ongoing research in the PathChooser ITN, in close collaboration with other fellows: (i) the mucus tissue barriers

(e.g. respiratory and gastrointestinal tract) that are composed of mucin fibers and (ii) the tumor interstitial space system that is composed primarily of collagen fibers and defining an emerging bio-mechanical barrier. Guidelines regarding the indicated physicochemical characteristics of NPs towards these applications will be extracted.

A particular effort will be undertaken that early stage researcher joins the PhD program of UCY Dept. of Mechanical Engineering, Cancer Biophysics Lab, under new funding opportunities

Minimum requirements: The candidate should have a Bachelor's and preferentially a Master's degree or equivalent in Chemical Engineering, Bioengineering, Physics, Bioinformatics, Biology or related disciplines.

Special Requirements: As per MSCA requirements, the successful candidate should not have resided in Cyprus for 12 months or more over the 3 years preceding employment (excluding holidays).

Salaries, living allowances and additional benefits: The compensation for this position is the one specified by the Marie Curie FP 7 program rules. For this position which is specified for a researcher with research experience between 0 and 4 years the total employee cost allowed is the nominal Euro 3160/month, adjusted for the Cyprus coefficient of 0,887%. Out of this amount the employers and employees contributions, as well as the income tax applicable to the researcher, will be deducted. The current deduction rates and personal tax brackets can be found in the following links:

Employer and Employee Contributions: http://www.deloitte.com/assets/Dcom-Global/Local%20Assets/Documents/Tax/Taxation%20and%20Investment%20Guides/2012/dttl_tax_highlight_2012_Cyprus.pdf

Personal Income Tax: http://www.worldwide-tax.com/cyprus/cyprus_tax.asp

Should any of these contributions and/or tax brackets be adjusted by the Cyprus government, the researchers salary will be adjusted accordingly, in order to maintain the above mentioned maximum employee cost set by the Marie Curie FP 7 program rules.

Interested candidates should apply by sending an updated comprehensive CV and the names and contact details of 3 referees, no later than **June 30, 2016, to:**

odysseos@ucy.ac.cy; stylianopoulos.triantafyllos@ucy.ac.cy