



German Cancer Research Center | M123 | PO Box 101949 | 69009 Heidelberg | Germany

Master Thesis Position in the Division of Molecular Neurobiology

Project description:

We are a group of international scientists investigating conserved principles of stem cell activation in health and disease. We apply single-cell sequencing to compare differentiation processes in glioblastoma (GBM) and normal neurogenesis. We aim to identify regulators of quiescence which we can target in organoid models and develop towards regenerative and anti-cancer therapies.

Our project aims at understanding the role of Wnt signaling in malignant brain tumor progression. To this end, we have grafted human GBM cells transduced with a TCF/Lef-reporter into mouse brains and resolved tumor states by single-cell RNA sequencing. For the proposed **dry lab** position we envision the following ventures:

Development of a single-cell Wnt activity classifier

We seek to explore the role of Wnt signaling in other malignancies and models. Thus, we use the activity of our reporter to train a single-cell Wnt activity classifier (using SVM, decision trees, ANN etc.). The challenge lies deriving a set of minimal features robustly representing activity, and the integration of protein and RNA activity readouts.

Predicting tumor cell differentiation against neurogenesis reference

We seek to integrate human tumor states with their counterparts from normal mouse neurogenesis. This might be accomplished with a deconvoluting autoencoder trained to a species-invariant embedding, from which one could predict a cell's placement in neural differentiation trajectory.

Desired qualifications:

- Bachelor degree in biological or computational field
- Familiarity with linux systems and the python language
- Interest in biology and awareness of machine learning concepts

The candidate is expected to attend and contribute to the weekly group meetings and journal clubs.

Project start date:

As soon as possible

Contact information:

Interested candidates should directly contact Prof. Dr. Ana Martin-Villalba (a.martin-villalba@dkfz-heidelberg.de) and Leo Foerster (l.foerster@dkfz-heidelberg.de) with a short motivation and CV.

Further information can be found on our laboratory website: <http://martin-villalba-lab.github.io/>

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Heidelberg, 03/05/2021

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