

Identifying the role of transthyretin on adult neural stem cell fate



NICOLAS BAUDIN
INTERNSHIPS IN FRANCE INITIATIVE

Muséum National d'Histoire Naturelle - CNRS

Name of the hosting institution in France	Muséum National d'Histoire Naturelle CNRS 7221, Physiologie Moléculaire et Adaptations
Name of the host laboratory / research team	Interaction corps cerveau lors des processus adaptatifs
Address	7 rue Cuvier, 75005 PARIS
Web site	https://umr7221.mnhn.fr/spip.php?article1
Name of the supervisor	Sylvie REMAUD
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Internship offer

Topic of the internship (title) Identifying the role of transthyretin on adult neural stem cell fate.

Proposed dates of the internship **Start:** 2019-10-01 **End** 2020-03-31

Scientific and academic objectives of the internship (detailed description of the internship content, work expected from the intern and expected outcomes):

Context: The central nervous system is composed mainly of neurons and oligodendrocytes. The subventricular zone (SVZ) lining the lateral ventricle is one of the main areas in the mammalian brain where new neurons and glia are generated from neural stem cells (NSCs) throughout life. Regulation of thyroid hormone (TH) availability has been implicated in the complicated multi-step processes of

- (i) adult neurogenesis, and
- (ii) differentiation/maturation of oligodendrocyte precursor cells.

Transthyretin (TTR), a TH distributing protein that facilitates TH entry into the brain, is a key regulator of TH availability. Internship objectives: The main objective of the internship is to analyse the functional role of TTR in the balance between neurogenesis and oligodendrogenesis in the adult mouse brain. In particular, the candidate will first investigate how TTR is expressed in mature neuronal and glial cells. Second, he/she will analyse whether TTR is required for functional olfactory behaviour that depends on SVZ-neurogenesis. Lastly, he/she will study in wild type vs. Ttr null mice, the capacity of the SVZ to participate in brain repair in a mouse model that mimics some aspects of a well-known demyelinating disease, multiple sclerosis (MS).

This work could provide new insights regarding the functional regulation of adult neurogenesis governed by TH in the adult brain and especially how the fine-tuning of cell-specific TH availability modulated by TTR, controls the balance between neurogenesis and oligodendrogenesis.

This work will provide a better understanding of the events that could determine susceptibility to demyelinating diseases such as MS. This work will use mouse models.

To this end, the candidate will test the effects of Ttr loss-of-function on NSC fate differentiation and maturation in physiological and pathological conditions (cuprizone model) using in-vivo approaches (immunohistochemistry, fluorescent-activated cell sorting, olfactory memory tests).

Does the project involve a French industry partner?	No
Name of the Australian partner institution	RMIT University
Name of lab/department/team involved in the collaboration at the Australian partner institution	Richardson Laboratory, School of Health and Biomedical Sciences
Main contact in the Australian partner institution	Associate Professor Samantha Richardson
Function of the main contact in the Australian partner institution	Laboratory Head, Primary Supervisor
Email address of the main contact in the Australian partner institution	samantha.richardson@rmit.edu.au
Outside of this ongoing collaboration, will applications coming from students of other eligible Australian universities be considered by the hosting institution in France?	No

Expected profile of applicant

Level of study	Doctor of Philosophy
Discipline	Biomedical Science
Required qualities, knowledge and skills	<p>Laboratory Skills:</p> <ul style="list-style-type: none"> * Real-time PCR * Immunohisto/cyto-chemistry * Western blotting * Cuprizone model of demyelination * Microscopy (confocal, brightfield, fluorescence) * Small animal handling (surgery, dissection) * Cell culture <p>* Genotyping</p> <ul style="list-style-type: none"> * Electron microscopy * Flow cytometry * Fluorescence activated cell sorting * Liquid nitrogen handling <p>* Advanced IT skills Academic Skills:</p> <ul style="list-style-type: none"> * Report writing * Reading scientific literature * Presenting to audiences * Statistical analysis * Time management and planning <p>* Student supervision Personal Qualities:</p> <ul style="list-style-type: none"> * Reliable, punctual and well organised * Analytical and a problem solver * Adaptable and resilient * Technically minded * Communication skills * Team player * Focused and task orientated * Driven and motivated
Other specific eligibility criteria	English speaking