

PhD Project Description

School/Department:	Department of Neuroscience Erasmus MC
Supervisor information:	<ul style="list-style-type: none"> • Prof. Dr. Chris I. De Zeeuw, c.dezeeuw@erasmusmc.nl <ul style="list-style-type: none"> • https://neuro.nl/research/de-zeeuw • Personal Grants: <ul style="list-style-type: none"> - ERC Advanced Grant (ERC-Adv), 2014 - ERC PoC grants (ERC-PoC), 2015, 2016, 2017 - Dutch Scientific Organization (ALW-Open) Grants, 2016, 2017 - ZonMw Grant, 2016 - KNAW Grants, 2017, 2018 • Most important publications: <ul style="list-style-type: none"> - Nature Reviews 2012 13: 619–635 - Neuron 2013 22;78(4):700-13 - CSHP 2015 7(9):a021683 - Neuron 2016 89(3):645-57 - Neuron 2017 93(2):409-424 - Nature 2018 563(7729):113-116 - Science 2012 337(6095):749-53 - eLife 2014 10.7554/eLife.02536 - Cell Reports 2015 13(9):1977-88 - Nature Commun. 2016 1;7:12627 - Science 2017 356:1084-7 - Science Adv. 2018 4: eaas9426
Project Title:	Cerebro-cerebellar Interactions during Cognitive Processing
Abstract:	<p>Coordinating cognitive processes forms the most important and complex task of the brain. Not surprisingly, coordinated control of these functions requires intensive communication within and between many brain regions. Of crucial importance is the mutual communication between cerebellum and cerebral cortex (De Zeeuw, 2020, <i>Nature Reviews</i>; Gao et al., 2018, <i>Nature</i>). This becomes apparent, for instance, in patients suffering from autism (Peter et al., 2016, <i>Nature Commun</i>), spino-cerebellar ataxia (Hoogland et al., 2015, <i>Current Biol</i>), or Alzheimer's (Sepulveda-Falla et al., 2014, <i>J. Clin. Invest.</i>), in which the output neurons of cerebellum and cerebral cortex become dysfunctional. Before we can start to understand such pathology, we need to comprehend cerebello-cerebral communication under the normal conditions, like decision making and motor planning. For this reason we have developed a behavioral paradigm in which mice are being trained to use their whiskers to discriminate the location or properties of an object, to make a decision based on their sensory input during a delay period, and to report their decision as licking into a trained direction (Gao et al., 2018, <i>Nature</i>). This task has been shown to require proper functioning of the cerebellum and cerebral cortex, but it is unclear how subcortical structures ultimately determine direction encoding in this process (Boele et al., 2018, <i>Science Adv</i>). For this CSC project we will 1) record neuronal activity in the cerebellum, cerebral cortex and subcortical structures simultaneously in normal mice during and after training; 2) selectively modulate neuronal activity during and after training using optogenetics; and 3) rescue phenotypes in mouse models of autism, ataxia and Alzheimer's. Together, these specific aims should allow us to elucidate how interactions between cerebellum and cerebral cortex drive complex cognitive and motor tasks, and compensate for dysfunctions thereof in wide-spread brain diseases.</p>
Requirements of candidate:	<ul style="list-style-type: none"> • We are looking for a highly motivated, hardworking student to join our international team. Since we are tackling complex scientific questions regarding decision making, procedural learning, as well as memory disorders, we hope to find a student is willing to learn new techniques, has affinity with quantitative data analysis, and can communicate well. • Master degree in (bio)physics or neuroscience, an engineering degree, or an MD. • Scholarship that will cover subsistence allowance and international air plane ticket. • English language requirement: IELTS 7.0 (<i>min 6.0 for all subs</i>), TOEFL 100 (<i>min 20 for all subs</i>). When writing the CSC proposal we will help with the scientific part of your scholarship proposal.

Application requirements & Deadlines:

<https://www.eur.nl/en/about-eur/erasmus-university-china-centre/csc-scholarship>

Erasmus MC, ranked world

* No.32 for Clinical Medicine US News 2020:

<https://www.usnews.com/education/best-global-universities/clinical-medicine?page=3>

* No. 30 Nature Index for Biomedical Sciences 2019:

<https://www.natureindex.com/supplements/nature-index-2019-biomedical-sciences/tables/healthcare>