

## PhD Project Description

<b>School/Department:</b>	<b>Department of Neuroscience, Erasmus MC</b>
<b>Supervisor information:</b>	<ul style="list-style-type: none"> <li>• Prof dr MA Frens, full professor in Neuroscience</li> <li>• <b>Email:</b> <a href="mailto:m.frens@erasmusmc.nl">m.frens@erasmusmc.nl</a></li> <li>• <b>Website:</b> <a href="http://www.neuro.nl">www.neuro.nl</a></li> <li>• <b>Personal Grants, (examples):</b> <ul style="list-style-type: none"> <li>➢ NWO-SGW research talent (2018; PhD student)</li> <li>➢ 3 ESA grants (2017/2018)</li> <li>➢ NWO IMDI Grant (2012; 3 yr postdoc)</li> <li>➢ European FP7 ITN grant (2009; 2 AIO's )</li> <li>➢ Human Frontier grant (2008; 750 k\$ )</li> <li>➢ NWO-VIDI grant (2003; 600 k€)</li> </ul> </li> <li>• <b>Most important publications:</b> <ul style="list-style-type: none"> <li>➢ Nature Neurosci, PMID: 16568098</li> <li>➢ Neuron, PMID: 11430812.</li> <li>➢ Ann Neurol. PMID 31925838</li> <li>➢ PLoS One, PMID: 25894396</li> <li>➢ eNeuro, PMID: 30073197</li> <li>➢ Front Neurosci, PMID: 28824366</li> <li>➢ J Physiol, PMID: 12949226</li> <li>➢ IOVS, PMID: 27379580.</li> <li>➢ Spine, PMID: 26418634</li> </ul> </li> </ul>
<b>Project Title:</b>	<b>Predicting cortical maturation and autism spectrum disorder from cerebellar and brain-wide structural imaging data</b>
<b>Abstract:</b>	<p>In the past, the cerebellum has mainly been implicated in motor control. However, recent studies have highlighted the considerable role of the cerebellum in non-motor domains, such as executive functions, language skills and emotional processing. This is further signified by evidence indicating cerebellar development might play a crucial role in cortical maturation and by the presence of cerebellar dysfunction in neurodevelopmental disorders like Autism Spectrum Disorder (ASD).</p> <p>The cerebellum is strongly interconnected with the cerebral cortex, with its functional subunits being involved in a wide array of motor and cognitive tasks. Given that the cerebellum is among the first brain structures that differentiates but one of the last to mature, it is especially vulnerable to genetic and environmental stressors disrupting development. Yet, large population-based studies in the past have failed to investigate the cerebellum in much detail and have focused predominantly on neocortical development as the best predictor of future behavior. However, mounting evidence of the importance of the cerebellum for normal motor and cognitive behaviors stresses the urgency to move towards brain-wide association studies in large, longitudinal population cohorts, which are rapidly becoming the golden standard. The development of cerebello-neocortical networks can be particularly valuable for the prediction of adult behavior. Early-in-life disruption of cerebellar development has been shown to increase the risk for several developmental disorders such as ASD but also Attention Deficit/Hyperactivity Disorder (ADHD) and Developmental Dyslexia.</p> <p>We therefore hypothesize that cerebellar development (1) is essential for cortical maturation, (2) predicts autistic traits later in life, and (3) is distinctively affected with or without co-occurring attention deficits. Here, we aim to address these hypotheses using the uniquely large and well-studied cohort. We will analyze longitudinal structural MRI data from thousands of scans using state-of-the-art algorithms and correlate them to social responsiveness, a continuous outcome for autistic traits. In addition, we will identify the structural patterns of groups clusters for autistic traits and attention deficits, a common comorbidity of autism.</p> <p>The analytical framework developed in this project will describe normal developmental growth curves of the cerebellum in detail, a structure often ignored in large population-wide studies. Next, this project will substantially advance insights into the role of the cerebellum and its vast connections to other regions of the brain in ASD. Furthermore, the detailed developmental growth curves of the cerebellum can be used as a reference to study neurodevelopmental diseases suspected to have cerebellar involvement and will thereby prove useful for new innovative approaches in the newly founded Erasmus MC Child Brain Center.</p>
<b>Requirements of candidate:</b>	<ul style="list-style-type: none"> <li>○ We are looking for a highly motivated, hardworking student to join our very international team. Our strength is in using team work to tackle large scientific questions and thus requires a student with good communication skills.</li> <li>○ Master degree or MD</li> <li>○ Scholarship that will, at least, cover subsistence allowance and international air plane ticket (we could help with the scientific part of your scholarship proposal)</li> </ul>

Erasmus MC, ranked world no. 32 for [Clinical Medicine US News 2020](#) no. 30 [Nature Index for Biomedical Sciences 2019](#)

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|  | <ul style="list-style-type: none"><li>○ English language requirement:</li><li>○ <i>English speaking countries &amp; Netherlands</i>: no requirement<ul style="list-style-type: none"><li>○ <i>Other countries</i>: IELTS 7.0 (<i>min 6.0 for all subs</i>), TOEFL 100 (<i>min 20 for all subs</i>)</li></ul></li></ul> |
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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>