

## PhD Thesis Proposal (PTP)<sup>1</sup>

General Information		
PhD Thesis Title	<i>Towards Harmonizing Autism Diagnosis and Management in Lebanon: Biomarkers Identification, Public Awareness, and Legislative Reform</i>	
USEK Doctoral Program	<i>Biology</i>	
Joint Guardianship/Cotutelle	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Partnership university's doctoral program:
Research Center	USEK Platform – Paris Cité University	
Research Group	Neurodevelopmental Disorders Research Group	
Research Axis	Neurodevelopment	
PhD Supervisor	Name & Title: <b>Lebanon</b> Prof. Dr. Walid Hleihel, PhD in Physiology and Pharmacology Email <a href="mailto:walidhleihel@usek.edu.lb">walidhleihel@usek.edu.lb</a>  <b>France</b> Prof. Dr. Pierre Gressens, MD, PhD in Neurology <a href="mailto:pierre.gressens@inserm.fr">pierre.gressens@inserm.fr</a>	University Address:  Holy Spirit University of Kaslik - USEK  UMR1141 “NeuroDiderot,” Inserm – Université Paris Cité, Robert Debré Hospital, Paris, France
Co-supervisor (if applicable)	<b>Lebanon</b> Name & Title: Dr. Tania Bitar Email: <a href="mailto:taniabitar@usek.edu.lb">taniabitar@usek.edu.lb</a>  <b>France</b> Dr. Mireille La Forge, PhD, HDR in Immunology <a href="mailto:mireille.laforge@inserm.fr">mireille.laforge@inserm.fr</a>	University Address:  Holy Spirit University of Kaslik - USEK  UMR1141 “NeuroDiderot,” Inserm, Robert Debré Hospital, Paris, France
Location (s)	Location 1: USEK  Location 2: Inserm – Université Paris Cité, Robert Debré Hospital, Paris, France	Work shift calendar /per year (40%):  Work shift calendar /per year (60%):
Potential funding and scholarship	<ul style="list-style-type: none"> <li>•National Council for Scientific Research in Lebanon (CNRS-L) Grant Research Program.</li> <li>•USEK (Higher Center for Research) and Inserm (France), if applicable.</li> </ul>	

<sup>1</sup> The PhD Thesis Proposal should not exceed three pages. It shall be approved by the School/Faculty.

Applicant's Name and Profile	Master in Biology or Biochemistry
Comps Exam Language <b>(to be check-marked by the PhD Supervisor)</b>	<input checked="" type="checkbox"/> Oral Assessment <input checked="" type="checkbox"/> Written Assessment <input type="checkbox"/> Arabic <input type="checkbox"/> French <input checked="" type="checkbox"/> English

Subject's national or worldwide context, objectives & research lines
<p>Autism Spectrum Disorder (ASD) is a complex neurodevelopmental condition marked by persistent difficulties in social interaction, communication, and the presence of restricted, repetitive behaviors. Globally, ASD prevalence is on the rise, with estimates suggesting approximately 1 in 100 individuals are affected. In Lebanon, disparate regional data (ranging from 1 in 66 to 513 per 10,000 children) underscore the urgent need for harmonized diagnostic protocols and comprehensive prevalence studies. Despite progress in understanding ASD's genetics, metabolomics, and immune-related biomarkers, diagnosis in Lebanon remains inconsistent due to limited resources, unevenly distributed specialized services, and insufficient public awareness.</p> <p>This doctoral research proposes an interdisciplinary approach to address ASD in Lebanon while benefiting from international expertise through a joint collaboration. Our goals include: (1) harmonizing ASD diagnostic and management practices nationwide; (2) identifying immunological and gut microbiota biomarkers that could facilitate earlier and more targeted interventions; (3) promoting public awareness campaigns to reduce stigma, encourage early screening, and foster inclusive environments; and (4) informing legislative reforms that recognize ASD as distinct from intellectual disability.</p> <p>Drawing on existing work from the Neurodevelopmental Disorders Research Group (NDRG) at USEK, which has already contributed to identifying biomarkers in Lebanese ASD populations, the project aims to close gaps in healthcare access, decentralized services, and early intervention.</p> <p>By combining expertise in neuroscience, immunology, epidemiology, and policy advocacy, this thesis will extend the knowledge base through a research collaboration with Inserm–Université Paris Cité in France. Successful outcomes will translate into evidence-based strategies for policymakers, healthcare professionals, and families, ultimately improving the quality of life for individuals with ASD and fostering a more inclusive, equitable society.</p>

Outcomes (OCs): What do we wish to achieve?	
OC1:	Establish a standardized, nationwide diagnostic and management protocol for early ASD detection in Lebanon.
OC2:	Identify and validate immunological (blood-based) and gut microbiota (fecal-based) biomarkers for ASD to support personalized intervention strategies.
OC3:	Implement public awareness campaigns and workshops aimed at reducing stigma, promoting early detection, and enhancing social inclusion of individuals with ASD.

OC4:	Provide evidence-based recommendations and advocacy materials to legislators, aiming to formally recognize ASD as a distinct neurodevelopmental condition and secure tailored resources.
------	--

<b>References (R) (5 most recent peer-reviewed publications in the field)</b>	
R1:	Gerges, P., Bitar, T., Laumonnier, F., Marouillat, S., Nemer, G., Andres, C. R., & Hleihel, W. (2022). Identification of Novel Gene Variants for Autism Spectrum Disorders in the Lebanese Population Using Whole-Exome Sequencing. <i>Genes</i> , 13(2), 186.
R2:	Rouphael, M., Bitar, T., Sacre, Y., Andres, C. R., & Hleihel, W. (2023). Evaluation of the Lebanese Adults' Knowledge Regarding Autism Spectrum Disorder. <i>International Journal of Environmental Research and Public Health</i> , 20(5), 4622.
R3:	Bitar, T., Mavel, S., Emond, P., Nadal-Desbarats, L., Lefèvre, A., Mattar, H., ... & Andres, C. R. (2018). Identification of metabolic pathway disturbances using multimodal metabolomics in autistic disorders in a Middle Eastern population. <i>Journal of Pharmaceutical and Biomedical Analysis</i> , 152, 57–65.