

## Annex 2 – Research Topics for Spoke n. 6

From the final Work Plan: General description and Work Packages

### S6. NEURODEGENERATION, TRAUMA AND STROKE:

S6 aims to integrate multiple experimental methodologies to capture the neural bases of neurodegeneration and stroke as well as the interaction between trauma and brain function, in order to shed light on the underlining processes and foster the development of novel biomarkers and therapeutic targets. The understanding of the molecular pathways leading to neurodegeneration, the development of biomarkers to predict disease progression and treatment response, and the identification of novel druggable targets to reduce the disability burden associated with these processes and conditions, represents the expected outcomes of the planned research.

#### WP1 - Mechanisms of neuronal cell degeneration and drug dependent reversal

#### WP2 - Multi-modal approaches to monitoring progression of neurodegenerative diseases and definition of novel rehabilitation methodologies

#### WP3 - Neurodegeneration in stroke

#### WP4 - Multi-parametric imaging and neurophysiological approaches to monitor neurodegeneration in the central and peripheral nervous system

#### Topics

	TEMATICA	Costo minimo di ogni proposta progettuale	Costo massimo di ogni proposta progettuale
a	Development of patient-specific hiPSCs from individuals carrying well-characterized causative mutations of neurodegenerative diseases, and optimization of 2D and 3D neural systems for phenotypic, functional (MEA or calcium imaging) or pharmacological (drug screenings) studies.	200.000,00 €	250.000,00 €
b	Cell- and microcircuit-level experimental multimodal probing and digital reconstruction of cortical human brain tissue: linking structure and function by in vitro multi-site and multi-scale recording techniques with in silico simulation.	120.000,00 €	150.000,00 €
c	Targeting non-neuronal proteostasis alterations in neurodegenerative diseases: focus on inter-organelle communication and identification of novel pharmacological targets.	120.000,00 €	150.000,00 €
d	Advanced characterization of subcellular structural composition and synaptic features and their implications in neurodegenerative disorders.	120.000,00 €	150.000,00 €

e	Neuroimaging and fluid markers of neurodegeneration across dementing and movement disorders: insights from cohort studies	80.000,00 €	100.000,00 €
f	Molecular profiling early phases of Parkinson's and Alzheimer's diseases: interaction between inflammatory processes and protein misfolding.	120.000,00 €	150.000,00 €
g	Development of biomarkers to identify patients in the early stage of neurodegenerative diseases and acute brain damage, to set individualized and preventive strategies, to improve patient prognosis and quality of life.	120.000,00 €	150.000,00 €
h	Microglia modulation of synaptic/neuronal homeostasis and metabolism: consequences on the shaping of neuronal circuits and implications for susceptibility to neurodegenerative diseases.	120.000,00 €	150.000,00 €
i	Neural Network models of default activity patterns in the physiological and pathological (neurodegeneration or trauma) unconscious brain to design biomarker based on the microscopic cortical activity.	80.000,00 €	100.000,00 €
l	Cognitive tele-rehabilitation in the field of neurodegenerative diseases: provision of a 'network-based' cognitive rehabilitation program on 'home-based' virtual technology to improve cognitive abilities remotely	120.000,00 €	150.000,00 €
m	Integrated approaches of molecular imaging, quantitative magnetic resonance imaging, and radiomics to characterize heterogeneity in neurodegenerative diseases.	120.000,00 €	150.000,00 €
<b>TOTALE:</b>		<b>1.320.000,00 €</b>	<b>1.650.000,00 €</b>

**N.B. La tabella sottostante riporta le tematiche il cui finanziamento è espressamente riservato agli Organismi di Ricerca con sedi operative in cui svolgeranno l'attività nel sud Italia.**

	TEMATICA	Costo minimo di ogni proposta progettuale	Costo massimo di ogni proposta progettuale
n	Characterization of structural/conformational features of different amyloid and amyloid-like aggregates and their interaction with hosts using FLIM/STORM in a 2-Photons (2P) analysis and through enzymatic digestion and multiple-fragmentation technique in LC-MS triple quadrupole.	120.000,00 €	150.000,00 €
o	Development of innovative technologies for rehabilitative treatments in preclinical models: a smart box (automated, computer-controlled) to monitor animal behavior during motor tasks novel implantable	120.000,00 €	150.000,00 €



	technologies for monitoring electrophysiological activity, sensors to collect physiological parameters able to assess and quantify also the non-motor symptoms due to the pathology (e.g., depression).		
<b>p</b>	In vitro and in silico studies on the role and pharmacological targeting of ion channels and endolysosomes associated with neurodegeneration and neuroexcitability defects, integrating next generation electrophysiology and AI approaches.	200.000,00 €	250.000,00 €
<b>q</b>	Dynamics of neuronal calcium, sodium and mitochondria membrane potential in rodent models of neurodegenerative diseases.	120.000,00 €	150.000,00 €
<b>TOTALE:</b>		<b>560.000,00 €</b>	<b>700.000,00 €</b>