ERA-NET NEURON

European Research Projects on External Insults to the Nervous System

Joint Transnational Call 2016

Impact Report

by

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Task 4.5: Impact analysis of the co-funded call (task leader: ANR, France; contributing: FCT, Portugal; DLR, Germany; CIHR-INMHA, Canada)
The data collected through these questionnaires in the final reports of the funded projects (Task 4.3) and the outcomes from the status seminar (Task 4.4) will be analyzed in depth and compiled in a global output report, which will be make publicly available and/or used for dissemination and communication activities (e.g. in our newsletters, NEURON leaflets, and on the NEURON web site; see also WP5).

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Abbreviations

ANR	French National Research Agency, France
BMBF	Federal Ministry of Education and Research, Germany
CIHR-INMHA	Canadian Institutes of Health Research – Institute of Neurosciences, Mental Health and Addiction, Canada
CSO-MOH	Chief Scientist Office, Ministry of Health, Israel
FCT	Foundation for Science and Technology, Portugal
FNRS	Fonds de la Recherche Scientifique, Belgium
FRQS	Fonds de recherche du Québec-Santé, Canada
FWF	Austrian Science Fund, Austria
FWO	Research Foundation Flanders, Belgium
ISCIII	National Institute of Health Carlos III, Spain
MINECO	Ministry of Economy and Competitiveness, Spain
MOH	Ministry of Health, Italy
MRC	Medical Research Council, United Kingdom
NCBR	National Centre for Research and Development, Poland
NWO	Netherlands Organisation for Scientific Research, The Netherlands
RCN	The Research Council of Norway, Norway
SAS	Slovak Academy of Sciences, Slovakia
SNSF	Swiss National Science Foundation, Switzerland
TUBITAK	The Scientific and Technological Research Council of Turkey, Turkey
UEFISCDI	Executive Agency for Higher Education, Research, Development and Innovation Funding, Romania
VIAA	State Education Development Agency, Latvia

Introduction

ERA-NET NEURON

Public health is a central priority for individuals and governments globally. Worldwide, the WHO estimates one billion people suffer from neurological disorders, with disorders of the brain accounting for 1 in 10 deaths. Among the neurological conditions, the traumatic injury to the nervous system is the most frequent; leading to acute as well as potential long-term health consequences. In recent years, research efforts have resulted in new knowledge on the pathophysiology of traumatic injuries of the nervous system but translational efforts are still needed to fully address the clinical needs of patients. Since developing and translating basic neuroscience research into preventive, diagnostic and therapeutic outcomes for clinical use is a priority for public health policy, ERANET NEURON Cofund and the European Commission launched in 2016 a call for translational research proposals on external insults to the nervous system.

The European community includes a vast pool of scientific and medical expertise. In order to coordinate research objectives and promote European research collaborations, the European Commission developed European Research Area NETworks (ERA-NETs). These ERA-NETs aim to support and encourage cross-border collaboration in various fields of research by supporting joint activities. The Network of European Funding for Neuroscience Research (NEURON; www.neuron-eranet.eu) was initiated in 2003 as a pilot Specific Support Action. It was developed into an ERA-NET in 2007 and has been funded by the European Commission in four phases: NEURON I (2007 – 2011), NEURON II (2012 – 2015) and NEURON Cofund (2016-2020), NEURON Cofund2 (2021-2025). The overarching aim of NEURON is to support the translation of results from fundamental brain research into improved prevention, diagnosis, therapy and rehabilitation for patients, their family, and carers.

Joint Transnational Calls (JTC) for research proposals are the centrepiece of NEURON's transnational activities. On behalf of national ministries and funding organizations, NEURON coordinates an annual launch of a JTC in the field of disease-related neuroscience addressing important issues in fundamental neuroscience, neurology, or psychiatry (see call topics table 1). These funding calls aim to push forward research in strategically identified areas by encouraging transnational and cross-disciplinary projects. The main activity of NEURON is therefore the coordinated, transnational funding of basic, clinical and translational research on the nervous system. The NEURON initiative today is the result of the coordinated efforts of 25 funding organisations across 22 countries engaging in a joint effort to promote excellent research in disease-oriented neuroscience.

Year	Topic	Impact Report
2008	Neurodegeneration	Published 2014
2009	Method and Technology Development	Published 2015
2010	Mental Disorders	Published 2017
2011	Cerebrovascular Diseases	Published 2017
2012	Method and Technology Development II	Published 2018
2013	Mental Disorders II	Published 2019
2014	Neuroinflammation	Published 2020
2015	Neurodevelopmental Disorders	Published 2022
2016	External Insults to the Nervous System	**Current**
2017	Synaptic Dysfunction	Projects Ongoing
2018	Mental Disorders III	Projects Ongoing
2019	Biomarkers	Projects Ongoing

2020	Sensory Disorders	Projects Ongoing
2021	Neurodevelopmental Disorders	Projects Ongoing
2022	Cerebrovascular Diseases	Recent Selection
2023	Vulnerability and Resilience in Mental Heatlh	Launched

Table 1: JTCs launched under ERA-NET NEURON

Joint Transnational Call 2016 "European Research Projects on External Insults to the Nervous System"

For the 9th NEURON JTC, 22 funding organisations from 18 countries and the European Commission launched a Joint Transnational Call for Research Proposals on 'External Insults to the Nervous System' (table 2), resulting in a total of ~18.4 M€ in funding for 19 successful projects (table 3). Traumatic physical insults to the brain or spinal cord are the most frequent cause of neurological conditions. JTC 2016 invited projects including research from basic disease mechanisms up to proof-of-concept clinical studies covering either a) Fundamental research investigating consequences of external insults to the central nervous system on a biological and functional level. This could include the development of innovative or shared resources, and new technologies for the prediction, prevention or therapy of disease and/or b) Clinical research, including the exploitation of clinical data sets, to develop new strategies for diagnosis, therapy, and technology-driven neurorehabilitation (e.g. brain computer interfaces, EEG and neuroimaging approaches) for diseases after external insults to the central nervous system.

Partner Countries	Funding Agencies
Austria	Austrian Science Fund, FWF
Belgium	Fonds de la Recherche Scientifique, FNRS Research Foundation Flanders, FWO
Canada	Canadian Institutes of Health Research – Institute of Neurosciences, Mental Health and Addiction, CIHR-INMHA Fonds de recherche du Québec-Santé FRQS
France	French National Research Agency, ANR
Germany	Federal Ministry of Education and Research, BMBF
Israel	Chief Scientist Office, Ministry of Health, CSO-MOH
Italy	Ministry of Health, MOH
Latvia	State Education Development Agency, VIAA
Norway	The Research Council of Norway, RCN

Poland	National Centre for Research and Development, NCBR
Portugal	Foundation for Science and Technology, FCT
Romania	Executive Agency for Higher Education, Research, Development and Innovation Funding, UEFISCDI
Slovakia	Slovak Academy of Sciences, SAS
Spain	National Institute of Health Carlos III, ISCIII Ministry of Economy and Competitiveness, MINECO
Switzerland	Swiss National Science Foundation, SNSF
The Netherlands	Netherlands Organisation for Scientific Research, NWO
Turkey	The Scientific and Technological Research Council of Turkey, TUBITAK
United Kingdom	Medical Research Council, MRC

Table 2: Funding Organisation participating in JTC 2016

The selection of research projects was completed in two peer-reviewed stages by a pool of 37 international experts. For the first step, 93 consortia submitted a short pre-proposal that was evaluated by 3 expert reviewers. Of these, 43 consortia were invited to present a full proposal, which was again evaluated by expert reviewers before the final ranking was made by a 17 -member peer-review panel and 2 external reviewers.

Projects were evaluated using the following criteria:

1. Excellence
    - Scientific quality of the approach and methodology
    - Novelty of the scientific concept/hypotheses
    - Competence and experience of participating research partners in the field(s) of the proposal (previous work in the field, specific technical expertise)
2. Impact
    - Potential impact of the expected results on clinical and other health related applications
    - Added-value of transnational collaboration
3. Quality and efficiency of the implementation
    - Feasibility of the project
    - Coherence and effectiveness of the work plan, including appropriateness of the allocation of tasks, resources, time-frame and related risk analysis

- Quality and added-value of collaborative and multi-disciplinary interactions within the consortium
- Appropriateness of the management structures and procedures

The 19 successful projects included 92 research groups, with funding provided by national agencies in 16 countries. Selected projects as expected were concerned by the study of the pathophysiology and the development of therapeutic approaches for both brain and spinal cord injuries (Table 3).

The projects used a large variety of human data and experimental models including IPSCs, cell lines, transgenic rodent models, zebrafish and non-human primates. The methodologies used span from molecular/cellular biology, imaging, advanced electrophysiological measurements, viral vectors, DREADDs, nanobodies, *omics* approaches, clinical assessments, immunology, etc.

ACRONYM	Proposal Title	Partners (Coordinator in bold)	Country (Agency)	Pathology
ACROBAT	Altered Chloride homeostasis in Reactive plasticity upOn BrAin Trauma	**Claudio Rivera**	France, ANR	**Traumatic brain injury**
		Jean-christophe Poncer	France, ANR	
		Francois Guillemot	UK, MRC	
		Christian A. Hübner	Germany, BMBF	
		Liset Menendez de la Prida	Spain, MINECO	
ELPIS	Emergence of a spinal micturition reflex after SCI: abolition by silencing of hyper-excited C-fiber bladder afferents by gene therapy to restore continence and micturition.	**François Giuliano**	France, ANR	**Spinal cord**
		Francesco Montorsi	Italy, MoH	
		Francisco Wandosell	Spain, MINECO	
ICON-TBI	International Collaboration On Neuroinflammation in Traumatic Brain Injury	**David Menon**	**UK, MRC**	**Traumatic brain injury**
		Elisa R. Zanier	Italy, MoH	
		Vincent Degos	France, ANR	
		Karen Barlow	Canada, CHR	
NEURONICHE	Spinal cord repair from endogenous stem cells in the spinal niche	**Catherina Becker**	**UK, MRC**	**Spinal cord**
		Jean Philippe Hugnot	France, ANR	
		Michael Brand	Germany, BMBF	
		Matthias Kirsch	Germany, BMBF	
		Serge Muyldermans	Belgium, FWO	
		Urszula Sławińska	Poland, FCT	
REACT NSCs	Induction of Reactive Neural Stem Cells by Traumatic Brain Injury in the Adult Hippocampus.	**Juan M Encinas**	**Spain, MINECO**	**Traumatic brain injury**
		Djoher Nora Abrous	France, ANR	
		Veerle Baekelnadt	Belgium, FWO	
		Carlos P Fitzsimons	The Netherlands, NWO	
SiMPly Rehab	Seeing-Moving-Playing: Early Rehabilitation utilizing visual and vestibular technology following traumatic brain injury	**Isabelle Gagnon**	**Canada, CHR--FRQS**	**Traumatic brain injury**
		Kathryn Schneider	Canada, CHR	
		Mathilde Chevignard	France, ANR	
		Michal Katz-Leurer	Israel, CSO-MOH	
TRAINS	Time dependent Remote Alterations after Injury to the Nervous System	**Jérôme Badaut**	**France, ANR**	**CNS injury**
		Nikolaus Plesnila	Germany, BMBF	
		Michal Schwartz	Israel, CSO-MOH	
		Pierre Gressens	France, ANR	
		Krzysztof Selmaj	Poland, FCT	
		Maija Dambrova	Latvia, VIAA	
SILENCE	Spinal Cord Injury-induced Systemic Maladaptive Immune Response and Autoimmunity to Central Nervous System Antigens	**Jan M. Schwab**	**Germany, BMBF**	**Spinal cord**
		Caroline May	Germany, BMBF	
		Romana Höftberger	Austria, FWF	

		Armin Curt	Switzerland, SNSF	
		Giorgio Scivoletto	Italy, MoH	
AxonRepair	Spinal cord repair: releasing the neuron-intrinsic brake on axon regeneration	**Joost Verhaagen**	**The Netherlands, NWO**	**Spinal cord**
		James Fawcett	UK, MRC	
		Lawrence Moon	UK, MRC	
		Frank Bradke	Germany, BMBF	
		Alyson Fournier	Canada, FRQS	
		Dasa Cizkova	Slovakia,SAS	
CERMOD	Non-invasive electrical stimulation of the cervical spinal cord to facilitate arm and hand functional recovery in incomplete traumatic cervical spinal cord injured patients	**Guillermo García-Alías**	**Spain, ISCIII**	**Spinal cord**
		Joan Vidal	Spain, ISCIII	
		Andrew Jackson	UK, MRC	
		Joel C. Glover	Norway, RCN	
LEAP	New therapeutic strategies in the treatment of traumatic brain injury by targeting the LEctin Activation Pathway of complement	**Maria Grazia DE SIMONI**	**Italy, MdS**	**Traumatic brain injury**
		Anna PLANAS	Spain, MINECO	
		Wilhelm SCHWAEBLE/ Russel Wallis (PI change)	UK, MRC	
		Eberhard WEIHE	Germany, BMBF	
		Joanna MIKA	Poland, NCBR	
KidBrainIT	Paediatric Brain Monitoring with Information Technology (KidsBrainIT): Using Information Technology (IT) Innovations to Improve Childhood Traumatic Brain Injury Intensive Care Management, Outcome, and Patient Safety	**Tsz-Yan Milly Lo**	**UK, MRC**	**Traumatic brain injury**
		Ian Piper	UK, MRC	
		Bart Depreitere	Belgium, FWO	
		Juan Sahuquillo	Spain, ISCIII	
		Stefan Iencean	Romania, UEFISCDI	
RATER-SCI	Repurposing acute therapies for enhanced recovery after spinal cord injury	**John Kramer**	**Canada, CIHR**	**Spinal cord**
		Armin Curt	Switzerland	
		Frank Bradke	Germany, BMBF	
		Catherine Mercier	Canada, FRQS	
		Dolors Soler	Spain, ISCIII	
BIO-AX-TBI	Developing and validating blood and imaging BIOmarkers of AXonal injury following Traumatic Brain Injury	**DAVID Sharp**	**UK, MRC**	**Traumatic brain injury**
		Henrik Zetterberg	UK, MRC	
		Mauro Oddo	Switzerland, SNSF	
		Guido Bertolini	Italy, MoH	
		Sandra Magnoni	Italy, MoH	
Micronet	Cortical microcircuitry after traumatic brain injury: from molecules to networks	**Aya Takeoka**	**Belgium, FWO**	**Traumatic brain injury**
		Francesco Roselli	Germany, BMBF	
		Magdalena Götz	Germany, BMBF	
		Marco Tripodi	UK, MRC	
		Daniel Wojcik	Poland, NCBR	
RepImpact	Repetitive Subconcussive Head Impacts - Brain Alterations and Clinical Consequences	**Inga Katharina Koerte**	**Germany, BMBF**	**Traumatic brain injury**
		Stephan Swinnen	Belgium, FWO	
		Nir Sochen	Israel, CSO-MOH	
		Roald Bahr	Norway, RCN	
		Peter Filipcik	Slovakia, SAS	

		Alexander Leemans	The Netherlands, NWO	
SCI-NET	Identification of novel bioactive mediators of tissue scarring, inflammation and extracellular matrix remodeling after spinal cord injury	**Elizabeth Bradbury**	**UK, MRC**	**Spinal cord**
		Samuel David	Canada, FRQS	
		Jan Schwab	Germany, BMBF	
		Ralph Schlapbach	Switzerland, SNSF	
hMRIofSCI	Understanding the mechanisms of atrophy associated with spinal cord injury: the application of MRI-based in vivo histology and ex vivo histology	**Armin Curt**	**Switzerland, SNSF**	**Spinal cord**
		Jan Klohs	Switzerland, SNSF	
		Siawoosh Mohammadi	Germany, BMBF	
		Martina Callaghan	UK, MRC	
		Nikolaus Weiskopf	Germany, BMBF	
		Paweł Tabakow	Poland, NCBR	
TAI-MRI	A New Traumatic Axonal Injury Classification Scheme based on Clinical and Improved MR Imaging Biomarkers	**Anne Vik**	**Norway, RCN**	**Traumatic axonal injury**
		Patrick Cras	Belgium, FWO	
		Bram van Ginneken	The Netherlands, NWO	
		David Menon	UK, MRC	

Table 3: JTC 2016 Funded Projects and Consortia

Key Performance Indicators

As part of the final report for each project, researchers were asked to fill out a questionnaire to measure the key performance indicators set by NEURON (table 4). A summary of the different aspects evaluated by this questionnaire is described below and organised according to ERA-NET NEURON's overarching objectives.

Objective of the Funding Programme	Key performance indicators	Measures (i.e. items in the questionnaire)
1. Enhance excellent cooperation between scientists working in the field of neuroscience	Communication of results	List of publications and communications - level of co publication, bibliometric indicators. (**Question 1.2**)
	NEURON JTC as starter of new collaborations	Have the partners participating in the NEURON project collaborated before applying for the NEURON JTC2016? (**Question 3.1**)
	New research groups from other countries joining the consortium	During the life time of the project has the consortium established collaboration(s) with other teams (not already participating in the JTC 2016 project)? (**Question 3.2**)
	Sustainability of the collaboration (obtaining further funding for the same consortium)	Have the results led to new initiatives in other types of funding programmes? (**Question 3.3**)
	Intensity of collaboration, early researcher participation (mobility)	List of meetings, young researchers involved in the project, lab visits/exchange of researchers, and training within the consortium (**Question 3.4**)
2. Promote multi-disciplinary consortia and to encourage translational research proposals (from bench to bedside)	Consortium Composition	List of research groups
	Patient Involvement	patients/patient representatives involved in planning and/or conducting the research project? (**Question 6**)
	Patents and other outcomes with public health impacts	Patents and other outcomes with impact to health (**Question 2**)
3. Support the development of innovative or shared resources and technologies	Evaluation of the development and the use of new resources	Has the consortium created a new or further developed an existing transnational patient registry, database or biobank? Have the consortium partners exchanged biomaterials (DNA, tissues, cells, animals)? Including data management (**Questions 4 and 2**)

4. Support research to develop new strategies for diagnosis, therapy, and rehabilitation procedures	Evaluation of the development of new strategies for diagnosis, therapy, and rehabilitation procedures for brain or spinal cord injury.	Have the results of the NEURON research projects allowed the development of new strategies for: diagnosis, therapy (preparation of clinical trials), and rehabilitation procedures for cerebrovascular diseases, prevention or anything else? (**Question 5.1**)
	Major achievements	Please list the major achievement of the consortium. (**Question 5.2**)

Table 4: Key performance indicators in relation to the objectives of the funding programme (The number of the respective question in the questionnaire is given in brackets)

A summary of the major achievements expressed as percentage from the total number of consortia funded can be found in table 5. These results are further detailed in the sections below.

Objective of the Funding Programme	Key performance indicators	Results (percent of funded consortia, if not specified).
1. Enhance cooperation between European scientists working in the field of neuroscience	NEURON JTC as starter of new collaboration	→ ~30% were fully newly formed consortia → ~70% partially pre-existing consortia (part of PIs collaborated before)
	New research groups from other countries joining the consortium	→ 53% acquired new collaborations during the lifetime of the project.
	Sustainability of the collaboration (obtaining further funding for the same consortium)	→ 8 consortia (42%) had at least 2 PIs applying jointly for further funding
	Intensity of collaboration (meetings, mobility, joint publications)	→ 100% attended the mid-term symposium → On average each consortium held seven meetings; 53% of the meetings were attended by all partners →24% of the articles (of all publications) were published jointly in peer-reviewed journals
	Level of excellence of the funded research	→ 47% published at least one research article in a peer-reviewed journal with an Impact Factor above 10 (no reviews)
2. Promote multidisciplinary consortia and to encourage translational research proposals (from bench to beside)	Composition of the consortium	→ In 32% the coordinator was a medical doctor. → In 78% at least one PI was a medical doctor. → PIs worked in basic (75% of PIs) and clinical (19% of PIs) research labs as well as (11% of PI) in hospitals
	Involvement of patients	→ Patients were involved in 16% of the projects.
	Patents and other outcomes with impact to health	→ 36% developed outcomes with impact to health comprising links with biotech industrials, clinical protocols and international platforms for clinical research.

3. Support development of innovative or shared resources and technologies	Development and the use of new resources	→45% exchanged biomaterials and data (DNA: 63%, tissues: 63%, cells: 63%, animals 11%, clinical data: 42%)
4. Support research to develop new strategies for diagnosis, therapy, and rehabilitation procedures	Development of new strategies (in animals and/or humans)	→ 16% developed new strategies for diagnosis → 68% developed new strategies for therapy → 11% developed new strategies for rehabilitation
	Major achievements (in animals and/or humans)	→ The major achievements that were most frequently reported include: development of innovative therapies (68%), screening system (26%), identification of molecular factors (47%), and biomarkers (68%)

Table 5: Summary of major achievements in the frame of key performance indicators

Objective of the Funding Programme

1. Enhance excellent cooperation between scientists working in neuroscience

Communication of funded research results

Consortium partners were asked to report the dissemination channels of project results. This included peer-reviewed publications (journal articles, reviews, and books or book chapters), PhD dissertations, presentations (written and oral) to scientific congress, and articles dedicated to large public. Peer reviewed articles and reviews were included only if NEURON support was acknowledged. Table 6 presents a summary of the different communications produced by the funded consortia.

Type of publication	Total	Consortia (total)
Peer reviewed articles (including reviews)	**240**	19
Reviews	46	14
Large public papers	8	5
Books or book chapters	4	4
Communications in scientific congresses	341	18
PhD Dissertations	22 (+8 ongoing)	11 (+1 ongoing)

Table 6: Total publications resulting from projects funded through JTC 2016

All the consortia declared mainly peer reviewed publications at the end of the projects at a rate corresponding to a median value of 7 articles per consortia. Around 75 percent of the publications (including books) were authored by a single consortium member; and 16 consortia published articles authored by at least 2 consortium members (Fig. 1a). The findings include lack of effects of certain treatments at least for six consortia. Further publications are expected in the years to come since at least 96 new publications were in preparation by the 19 consortia at the time of the final report. **All the**

projects experienced delays and/or workplan modifications associated the Covid-19 pandemics mainly at the level of patient recruitments, material or personnel exchange, availability of infrastructures, animal availability, mobility of staff, and funding shortage due to project duration extensions. Frequent solutions required the use of previously existing data from clinical studies, change or reduction of experiments, use of other funding sources to continue the project, among others.

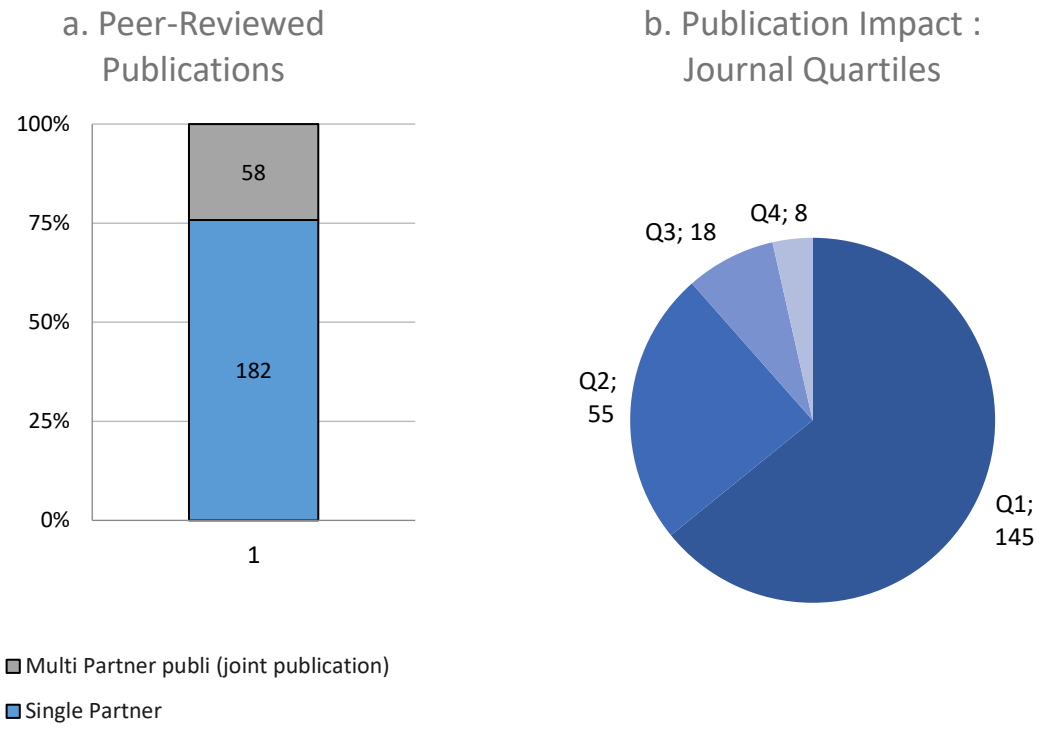

Figure 1: Peer reviewed publications. A Proportion of multi and single-partner peer reviewed articles published by the 19 funded consortia. B Distribution of peer-reviewed publications by quartile rank indexed in relevant disciplines associated to the neurosciences in the WoS (Q).

Web of Sciences (WoS) was used to categorise the publications in scientific domains. The fields of Neurosciences, Psychiatry or Neurology were taken as principal references for the analysis (Figure 1b and 2). The publications were less prominently indexed in other relevant fields such as cellular and molecular biology, general medicine and diverse medical specialities, biotechnology, or multidisciplinary sciences (Figure 2); these categories were considered for the analysis when the publications were not indexed in the neurosciences or associated fields.

Almost 90 percent of the peer reviewed publications excluding books were published in high impact journals (1st or 2nd quartile taking neurosciences or neurology as main references in the WoS-; Figure 1b).

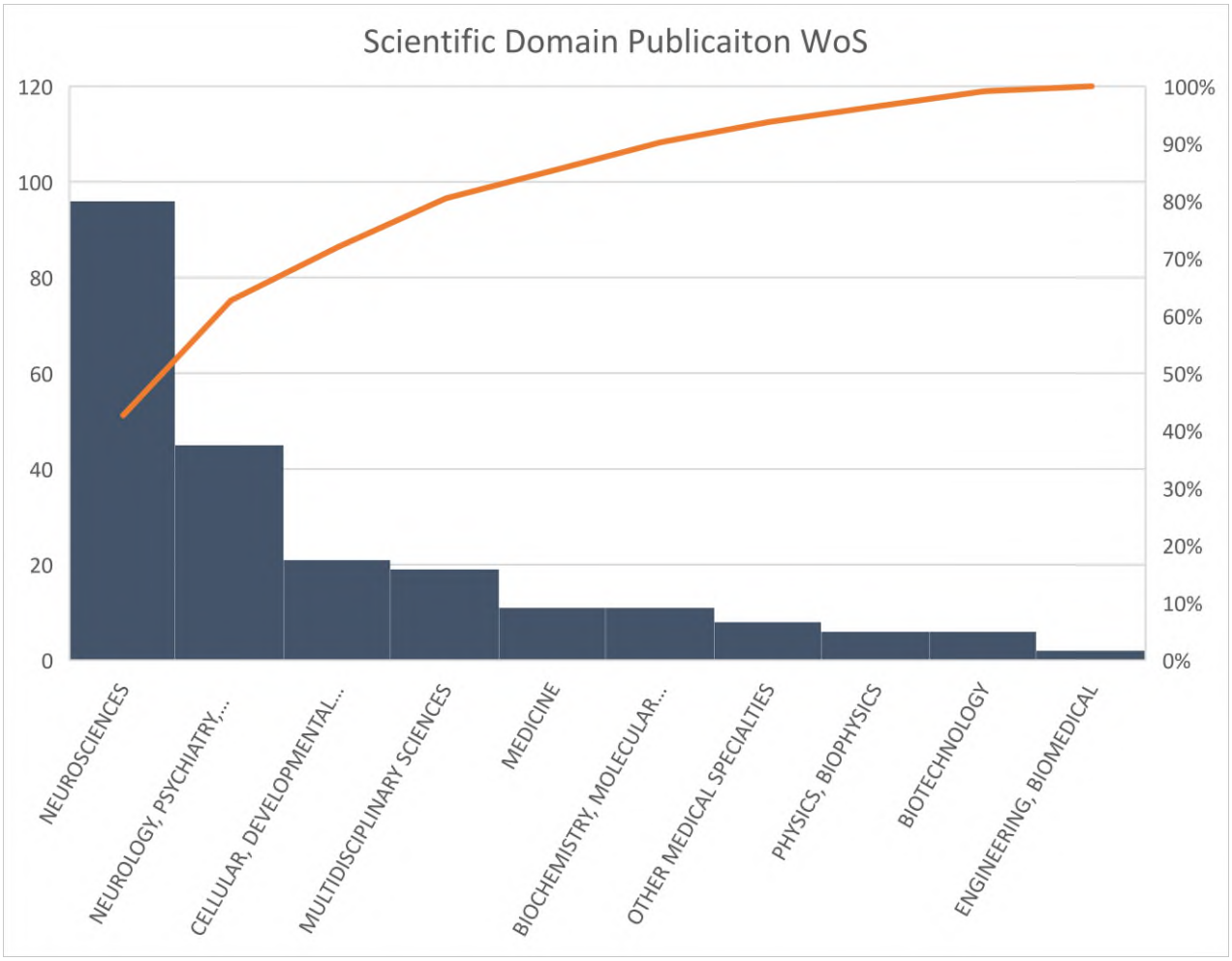

Figure 2: Peer reviewed publications main scientific domain according to the WoS. The picture depicts the main disciplines to which the publications produced by consortia funded in JTC 2016 contributed.

NEURON JTC as a starter of new collaborations

The questionnaire contained a series of questions on the structure of the consortia, including whether the partners had previously collaborated on a research project and whether new collaborations arose or will continue during and after the funding period. The results are summarised below.

Thirteen out of the nineteen funded consortia included members with a history of collaboration previous to this ERA-NET NEURON project; in general, the coordinator has collaborated with at least one partner; additionally, in six consortia other partners had as well previously collaborated. The consortia grew then by addition of new partners. In particular between the two evaluation steps 12 new partners joined 10 consortia invited to submit a full proposal, the majority from Poland but as well from Slovakia, Latvia and Romania which participated to the widening procedure in which inclusion of researchers from those communities was particularly encouraged. None of the funded consortia had worked together as a full group before the present call and six were completely newly formed.

New research groups from other countries joining the consortium

Fifteen consortia reported thirty new collaborations established with individual international research groups mainly European but also research groups and private companies, the last ones located in USA (2) Belgium (1) and Spain (1). The clinical research platform developed in one project extended from 4 initial contributing intensive care units to 8 additional ones some located in three European countries not initially involved in the consortium and potential links were in process with units located in 5 non-European countries at the end of the project. The new collaborations were frequently established to further explore aspects related to the initial project. Additionally, several partners generated links with the international initiative InTBIR; and partners of three funded consortia initiated in 2020 a new scientific society- European Neurotrauma Organization.

Sustainability of the collaboration

Researchers were asked to report follow-on collaborations including further funding applications by consortia members. This measure indicates the impact of consortium development, both in continuing to advance projects beyond the ERA-NET funding period, and the ongoing value of the academic collaboration.

Members of ten funded consortia applied for a total of 22 grants 11 in a national context and 11 international grants. The international grants include 5 submission to ERANET NEURON and two H2020 grants as well as 3 applications for grants at foundations in the UK and Sweden.

Intensity of Collaboration

Consortia are encouraged to organise regular in-person or virtual meetings and staff exchanges to take full advantage of the range of expertise of project partners and to develop the skillsets of individual lab members. All the consortia organised between 1 and 24 meetings (median of 5; total 131) 70 attended by the whole consortium and 61 by some of the consortium members. These meetings were considered fruitful to allow the exchange of scientific ideas and plan for funded and future work. In some cases, these meetings were extended to other consortia since links were established at the ERANET NEURON midterm symposium (see below).

A total of 55 members of staff involved in seventeen projects; mainly early career researchers -master and PhD students or postdocs- visited the partner labs to learn new techniques and exchange experience. The role of the early career researchers was frequently particularly acknowledged in the final reports since some of them played particularly important roles for the development of the project. For example, in one case the PhD student was responsible for dissemination of a technique among the partners and received a special international mention on her thesis. In another case an advanced postdoc assumed responsibility of the project after the mobility of the initial principal investigator. On top of the exchange of techniques these visits enabled networking and encouraged further collaborations allowing substantial experience for the early career researchers.

A Midterm Symposium was organised by NEURON in Bonn in 2019. A consortium member, the coordinator in general, gave a presentation on the consortium work progress and early career researchers presented posters. Four former reviewers evaluated the progress and the coordinators received feedback. Two main aspects were evaluated, scientific progress (outcomes produced/advancement of the workplan) and collaboration between the partners. In general, the

evaluations were satisfactory since the projects were considered properly advanced and some projects started publishing their results. The event allowed interaction between researchers (including early career researchers) on common topics of interest such as aspects associated to multicentre trials and scientific highlights in the field and enabled as well the interaction with national funders and EC representatives. Multiple collaborations were established among funded projects. Special workshops with a focus on responsible science and innovation were organised by ERANET NEURON and followed by all the attendees.

Summary

The present analysis shows that ERANET NEURON funding resulted in a high number of interactions between research groups in several countries. Most of these interactions were established for the first time within the consortia and were extended towards new research groups or industrial partners throughout the development of the project. As a highlight, the midterm symposium organised by ERANET NEURON resulted in collaborations among the consortia and was considered instrumental for the longer lasting structure of the field of brain and spinal cord injury in Europe, as reported by the attending researchers.
Most of the collaborations outlast the period of funding by ERANET NEURON as evidenced by the report of almost on hundred new publications were still in preparation at the end of the project. Ongoing follow up work was reported, which is at the origin of national and international applications for funding.
All consortia were very active and produced diverse and numerous publications with high relevance mainly in the field of neurosciences but also contributed publications in generalist and specialised medical journals as well as journals specialised in other basic research fields such as biochemistry or biotechnology.

2. Promoting multi-disciplinary consortia and translational research proposals (from bench to bedside)

Consortium composition

ERA-NET NEURON aims to promote the interdisciplinary collaboration to solve unmet medical needs in the field of nervous system disorders, through the development of translational research projects. As such it is expected that the consortia include expertise from basic academia but also any other expertise needed to pave the way towards solutions for the consequences of traumatic injury to the nervous system. Out of the 93 researchers, 34 were medical doctors represented in fifteen out of the 19 funded consortia, six of them as coordinators.

The large majority of researchers involved in the projects work in basic research laboratories and collaborate with researchers working in clinical research laboratories (18) and researchers working at hospitals (10). These collaborations exposed basic researchers to clinical setups and generated new experimental paths; allowed to more realistically approach the disease under study as well as validation of results in both preclinical and clinical contexts; on the other end this interaction enabled as well the development of tools with proven clinical value and the design of clinical trials. Finally, informal interactions among clinicians in different countries was beneficial for example for the discussion of special clinical cases.

Other than the principal investigators having applied for ERA-NET NEURON funding, the projects included other 204 staff members in the laboratories where the work was developed. Postdoctoral researchers and master, medical or PhD students, some of them funded through NEURON, represent the main category of staff in the projects (47 and 78, respectively). Some other staff categories such as technicians, associated researchers, medical doctors or engineers (respectively 37, 27, 8 and 4) were also reported as involved in the projects (Figure 3).

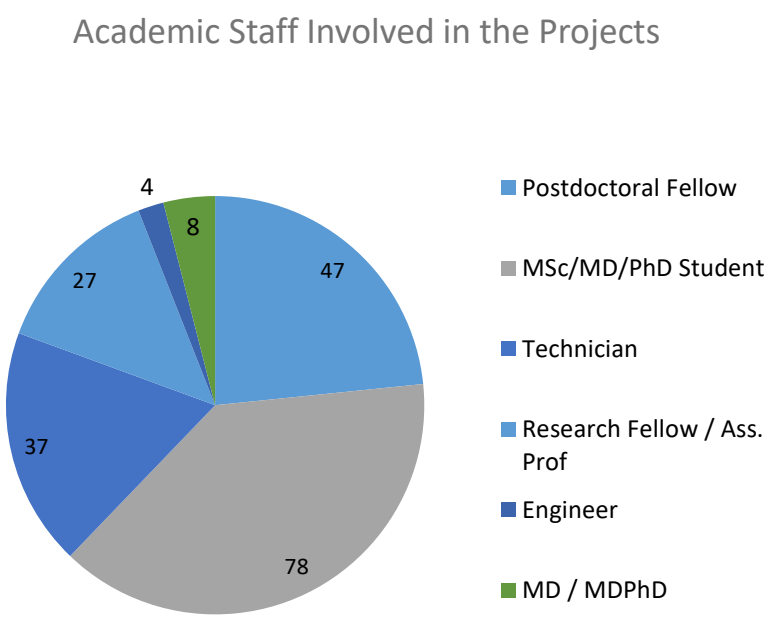

Figure 3: Staff participating in the funded projects

Patient Involvement

In agreement with the call objectives almost half of the projects used patient's cohort data from different origins: pre-existing or accessible through links established with ongoing clinical trials as well data from direct patient recruitment. Some projects required as well patient-derived material.

Researchers were asked to report the involvement of patients or patient groups as active members of the project. This includes involvement in the design, coordination (as part of a committee or advisory board), analysis or interpretation of research data, or in the dissemination of results. Only three of the projects involved patients two of them participating to the design and the three at the level of dissemination of results. Two other projects declared considering involvement in more applied follow up studies. The call text did not particularly encourage the participation of patients in the projects and this practice seems to evolve in the more recent editions of our calls.

Patents and other outcomes with public health impacts

None of the projects declared having filed patents or licences although; as mentioned above, three consortia established links with private companies in USA, Belgium and Spain. In one case to test compounds against epilepsy, in another to produce neuroprotective compounds and finally to study the role of biomarkers in posttraumatic epilepsy in the third project. One project created a start-up in France EG427 to produce a viral vector with therapeutical purposes in GMP conditions and develop dose-escalation and toxicity studies.

Numerous projects developed useful services and methods for human samples analysis of potential clinical use as described below. Some projects identified molecular biomarkers or developed protocols with prognostic value such as proteomics analytical services for human CSF samples, differential concentrations of CSF biomarkers in complete and partial spinal cord injury, antibody microarrays and autoimmune screening for brain and spinal cord patients; protocols to define clinical threshold for treatments in paediatric patients and clinical signatures of recovery in mild traumatic brain injury in teenagers. Other projects developed methods with diagnostic purposes such as tools to diagnose patient's severity after brain injury and segmentation methods and/or imaging biomarkers for injury.

The outcomes of the projects were disseminated to a large public in specific publications (see above) or in dedicated events targeting health care personnel in two consortia.

Concerning the therapeutics outcomes developed at clinical context, a project developed transcutaneous spinal cord stimulation methods with potential value for rehabilitation and a computer-based technique for brain stimulation for home therapy purposes while another implemented a protocol of brain stimulation and visual illusion for the treatment of neuropathic pain in chronic spinal cord injury in the daily clinical practice. Another consortium developed a new surgical method to improve catheter placement reproducibility in brain injured patients. Three clinical trials were under consideration to further develop the results of pilot clinical or preclinical studies funded under the ERANET NEURON scheme: respectively the first one aims to test the neurorestorative effect of a compound on spinal cord injury, the second one in the same project aims to establish a neuromodulatory therapy to treat neuropathic pain and increase recovery in spinal cord injury using transcranial stimulation and visual illusion; and finally another one to establish rehabilitation strategies for oculomotor, vestibulo-ocular and dynamic visual attention after mild brain injury.

At the preclinical level, most projects provided information concerning the pathophysiological mechanisms initiated by traumatic injury to the nervous system such as cell death, inflammatory processes, immune reactions, gene expression changes, pathological activation of neuronal circuits among others as well as mechanisms with potential to improve the recovery through axonal regeneration.

Half of the projects identified proteins or antibodies associated to the status of the injury both in the brain and the spinal cord. More than 10 therapeutic approaches based on studied pathophysiological mechanisms were tested in animal models including antibodies, pharmacological agents and constructs in viral vectors.

The consortia established international platforms to collect and share data on specific types of injury; in particular the platform KidsBrainIT is open for data contributors. The consortia generated as well patient registries, biobanks and clinical databases available for future work mainly within the consortia. New imaging detection protocols will as well be released in open access platforms for microbleeds detection, protocols for 3D imaging of spinal cord axons and for magnetic resonance in the spinal cord.

Summary

ERA-NET NEURON encourages the research communities to fill the gap between basic and clinical research towards translation and finally develop solutions susceptible to be used for the diagnosis and treatment of brain diseases. The consortia funded in the frame of JTC 2016 engaged into collaboration basic researchers as well as medical doctors to further understand the pathophysiology of central nervous system injury and develop diagnostic and therapeutic approaches. Several outcomes with direct clinical value were developed and at least three clinical trials were planned following the results of the project funded by ERANET NEURON. To further develop the outcomes of the projects a start-up was initiated by one of the consortia and some others established links with biomedical start-ups. Finally, new shared resources such as biobanks, patients' registries and databases should allow new collaborative research programs.

3. Supporting the development of innovative or shared resources and technologies

Development and the use of new resources

Other than the scientific publications the projects also generated a series of research resources shared among the partners of a project or open to broader scientific, clinical, and other relevant communities. These include new experimental methods such as health score for experimental models of injury in rodents or *in vitro* assay systems. In patients a project standardized protocols for vestibular therapy and another developed protocols to test impairment below the injury in the spinal cord.

The development of the project required exchange of materials among the laboratories including DNA, tissue, cells and other reagents such as viral vectors mainly, but also experimental animals and data as depicted in figure 5. Common protocols and practices were developed and harmonized among sites.

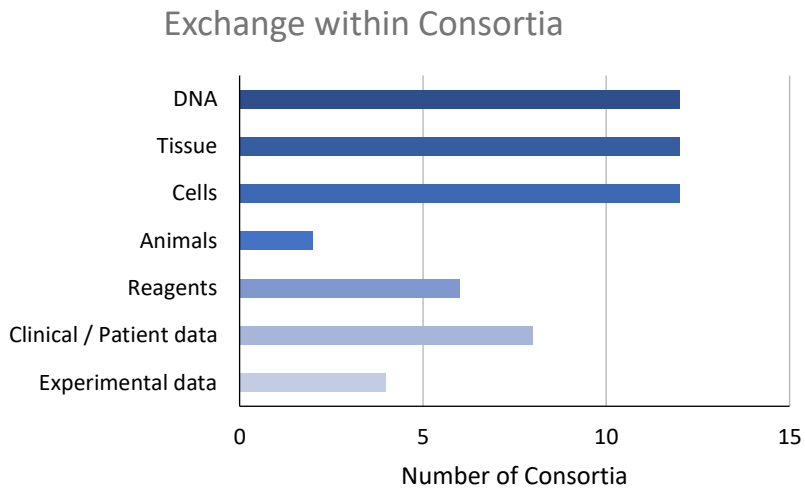

Figure 5: Exchange of resources among consortia members

Summary

ERA-NET NEURON aims to support the development of new tools and resources available to the research and clinical community at large. In the context of JTC 2016 the funded consortia were mainly concerned by the identification of pathophysiological mechanisms of dysfunction after central nervous system injury and largely on the development of approaches for the diagnosis, prognosis and treatment of such dysfunctions. As such the consortia generated protocols and experimental or clinical data which were exchanged between the participating laboratories, mainly. The resources generated within ERA-NET NEURON funding is expected to be further exploited to produce new knowledge on the brain disease field.

4. Supporting research to develop new strategies for diagnosis, therapy, and rehabilitation

Development of new strategies for diagnosis, therapy, and rehabilitation procedures for brain and spinal cord injury.

Thirteen consortia concentrated their work on the identification of pathophysiological mechanisms associated to the consequences of the injured central nervous system.

Nine consortia described molecular or genetic factors involved in the pathophysiology or the recovery after brain or spinal cord injury. Some of these are potential candidates to develop biomarkers and therapeutic targets. In patients seven consortia identified potential fluid and imaging biomarkers.

Eleven projects developed therapeutic approaches in preclinical models these span from pharmacological approaches with drugs and antibodies to gene therapy with viral vectors and rehabilitation training in rodents.

Three consortia developed therapeutic approaches for patient's rehabilitation in clinical setups such as protocols and devices for vestibular therapy in brain injury; transcutaneous stimulation for spinal cord injury so far developed in healthy volunteers but with promising effects as tested in non-human primates; as well as protocols to determine treatment thresholds in brain injury. A new protocol for reliable catheter placing in injured patients and two new methods for CSF extraction were as well delivered.

Finally, new tools with value for the clinical and research communities such as new screening methods, experimental devices and model systems were as well generated.

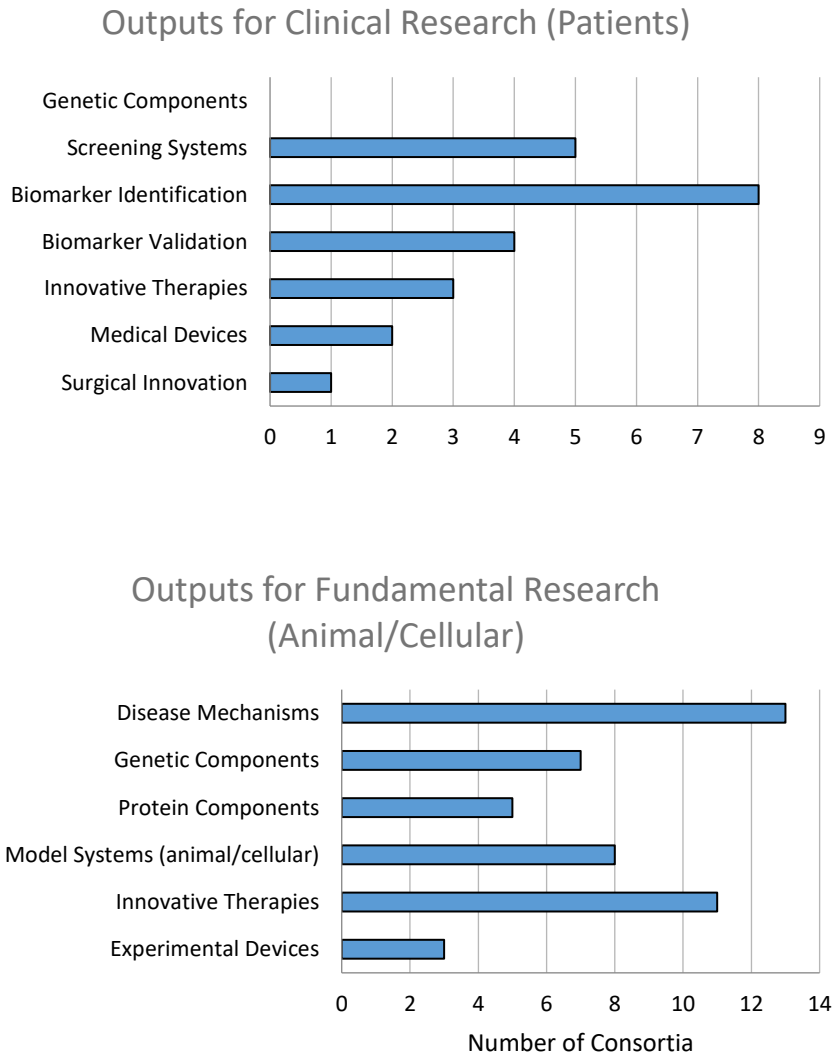

Figure 6: Output contributions for further research by consortia

Major achievements of the research consortia

As detailed in previous sections and in agreement with the general objectives of this call the project outcomes were concentrated on the study of disease mechanisms and the development of diagnostic, prognostic and therapeutic approaches for brain and spinal cord injuries.

Further multinational collaborations initiated in the context of this funding initiative continued after the end of the projects, and some of them brought the research questions to the level of future clinical trials and links established with industrial partners well in line with the overarching ERA-NET NEURON aim to pave the way for new or improved routes for diagnosis and therapy.

The networking initiated organised by the midterm symposium of ERANET NEURON increased the collaborations among consortia and participated to a stronger structuration of this research community. An impressive number of papers still in preparation at the timepoint of the final report and the joint applications for funding evidence the long-lasting collaboration established among the funded groups.

ERANET NEURON funding was of particular relevance as well for career advancement, in particular it was considered instrumental for the obtention of a professorship and a major grant by a female coordinator of one of the consortia. Some of the principal investigators had obtained their PhDs only five years before JTC 2016; the young principal investigators established collaborations with more experienced fellows though this funding scheme. PhD and post-docs as well benefited from the dynamics established within the consortia. First of all, 25 PhD dissertations were ongoing or completed in association with the developed projects in addition to the more than seventy postdoctoral and associated researchers involved in the projects. Nine prizes or mentions were obtained by early career researchers involved in funded projects- mainly poster prizes, article prizes or thesis special mentions.

Summary

In agreement with the general objectives of this call the project outcomes were mainly concentrated on the study of biological and functional consequences of external insults to the central nervous system on a biological and functional level as well as on the development of new strategies for diagnosis, therapy and rehabilitation for diseases resulting from external insults to the central nervous system. The projects extensively made use of previously available patients cohort's data.

The contributions span to a large variety of brain and spinal cord injury in young and adult individuals and led to new research paths at both preclinical and clinical levels. The continuation of the collaborations will result in new studies to further validate the clinical value of the approaches and findings. Important links were established among researchers within and outside the funded consortia but also with other academic, industrial stakeholders likely leading to increase the value of the scientific outputs and accelerate the research on brain and spinal cord injury.

Outstanding projects

All the projects funded in this call reported good quality outcomes. This section aims at highlighting the diversity of projects. The paragraphs below describe in particular examples which resulted in relevant scientific, clinical outcomes and/or careers advancement.

ELPIS

The objective of this project was to develop a gene therapeutic approach for urinary bladder dysfunction caused by spinal cord injury. The consortium designed herpes simplex virus (HSV-1)-based vectors to be injected into the bladder to silence bladder afferents stably and selectively in a preclinical setup. A startup was generated to produce a preindustrial vector with clinical purposes. The consortium is coordinated by a medical doctor collaborating with fundamental researchers in France, Spain and Italy. A scientific paper was published and another is in preparation both authored by all the consortium partners.

KidsBrainIT

This multidisciplinary project aimed to establish a *big data* infrastructure dedicated to life threatening brain injury in children. The project established a multi-center, multi-national pediatric TBI data-bank for current and future research including anonymized data from 16 intensive units in different countries. The analysis of the clinical data and outcome allowed to determine thresholds for treatment of this population; based on clinical evidence. The consortium is coordinated by a medical doctor working in the United Kingdom and collaborating with clinical researchers in Belgium, Spain and Romania. The partners published four multipartner papers.

BIO-AX-TBI

The project is a prospective multicentre cohort study using multiple techniques to identify fluid biomarkers of axonal injury with clinical outcome predictive value. The partners did harmonise all their methodologies and criteria among several European trauma centers. Two biomarkers were found to correlate with axonal injury and clinical outcome; the results were validated in a cohort of patients from another clinical study. The partners published two papers including all the consortium partners one of which was particularly highlighted by peers. The consortium was coordinated by a medical doctor working in United Kingdom in collaboration with medical doctor researchers working in Switzerland and Italy. The results were disseminated in a specific event targeting health care providers.

Leap

The consortium focused on the Lectin pathway cascade, activated by traumatic brain injury and in particular identified two molecular factors in the pathway which can result in deleterious effects. These factors were found increased in human tissue samples of traumatic brain injury. The consortia used pharmacological compounds already available for clinical use and showed an improvement of the sensorimotor and cognitive recovery as well as a reduction of the lesion size in preclinical studies. Additionally, in clinical studies the consortium identified blood biomarkers with high diagnostic power and early predictive potential. The consortium is coordinated by a basic researcher working in Italy and collaborating with clinical and fundamental researchers in Spain, Germany, Poland and the United Kingdom The consortium published six multiparter papers.

Rater SCI

This project evaluated pharmacological and rehabilitation interventions to increase motor function and/ or relieve neuropathic pain induced by central nervous system injury. In particular existing clinical treatments were repurposed and promising effects on motor function were identified in preclinical models. Moreover, the consortium tested a combination of brain stimulation and visual illusion with therapeutic purposes which was implemented in clinical practice to induce analgesic effects. A clinical trial was being finalized with this later technique at the time of the final report. The consortium is coordinated by a basic researcher working in Canada and collaborating with clinical and basic researchers in Switzerland, Germany and Spain. The consortium published eighteen articles; three of them multiparter.

Summary

All in all, the projects funded within JTC 2016 produced good quality to outstanding results either scientific, clinical or of career advancement. Multiple therapeutic approaches for brain and spinal cord injury were developed at the preclinical and clinical levels and the reported follow up studies could result in approaches applicable to the clinical practice in the near future.

As expected, most of the contributions concerned the analysis of disease mechanisms associated to central nervous system injury, some leading to important hints to develop biomarkers or treatments. Almost all projects reported a continuation of their collaborations, and several grants applications were reported for this purpose. In particular, at least three clinical trials were prepared based on the outcomes of the funded projects and numerous links with biotech start-ups were initiated. The widening scheme increased the participation of underrepresented scientific communities in the consortia and new collaborations were established with researchers not initially funded, thus increasing the networks initially established with our funding period. The still ongoing and future collaborations are expected to benefit the young researchers participating in these projects and in general to further structure the brain and spinal cord injury research and clinical communities.

Annex I Excerpt call text

Call for Proposals for

‘European Research Projects on External Insults to the Nervous System’

Submission deadline for pre-proposals: March 14 2016, 14:00 CET

Electronic proposal submission

For further information, please visit us on the web

http://www.neuron-eranet.eu

or contact

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1. Purpose

Maintenance, improvement and restoration of human health are of fundamental importance and worldwide priority. Biomedical and health research provide an important basis for the improvement of healthy living. Disorders of the brain are major causes of morbidity, mortality and impaired quality of life. Around one billion people suffer from disorders of the central nervous system. In Europe, disorders of the brain account for approximately one-third of the burden of all diseases. Therefore, neuroscience research and its translation into diagnostic and therapeutic outcomes are fundamental.

To address this, the 'Network of European Funding for Neuroscience Research' (NEURON) has been established under the ERA-NET scheme of the European Commission (http://www.neuron-eranet.eu). The aim of the ERA-NET NEURON is to co-ordinate research efforts and funding programmes of its partner countries in the field of disease related neuroscience.

Under the umbrella of NEURON, a joint transnational call (JTC-2016) is now launched together with the European Commission using the ERA-NET Cofund mechanism in the field of 'External Insults to the Nervous System'. The following funding organizations have agreed to fund the joint call for multinational research projects in this scientific area. The call will be conducted simultaneously by the funding organizations in their respective countries and co-ordinated centrally by the Joint Call Secretariat.

- Austrian Science Fund (FWF), Austria
- Fonds de la Recherche Scientifique (FNRS), Belgium
- Research Foundation Flanders (FWO), Belgium
- Fonds de recherche du Québec-Santé (FRQS), Québec (Canada)
- Canadian Institutes of Health Research – Institute of Neurosciences, Mental Health and Addiction (CIHR-INMHA), Canada
- French National Research Agency (ANR), France
- Federal Ministry of Education and Research (BMBF), Germany
- Chief Scientist Office, Ministry of Health (CSO-MOH), Israel
- Ministry of Health (MOH), Italy
- State Education Development Agency (VIAA), Latvia
- Netherlands Organisation for Scientific Research (NWO), The Netherlands
- The Research Council of Norway (RCN), Norway
- National Centre for Research and Development (NCBR), Poland
- Foundation for Science and Technology (FCT), Portugal
- Executive Agency for Higher Education, Research, Development and Innovation Funding (UEFISCDI), Romania
- Slovak Academy of Sciences (SAS), Slovakia

- National Institute of Health Carlos III (ISCIII), Spain
- Ministry of Economy and Competitiveness (MINECO), Spain
- Swiss National Science Foundation (SNSF), Switzerland
- The Scientific and Technological Research Council of Turkey (TÜBİTAK), Turkey
- Medical Research Council (MRC), United Kingdom

2. Aim of the call

The aim of the call is to facilitate multinational, collaborative research projects that will address important questions relating to external insults to the central nervous system. These insults often cause permanent disability and constitute a heavy burden for patients and their families. The call will accept proposals ranging from understanding basic mechanisms of disease through proof-of-concept clinical studies in humans to neurorehabilitation. **The focus of the call is on primary physical insults to the central nervous system, i.e. Traumatic Brain Injury (TBI) and Spinal Cord Injury (SCI).** The call covers acute traumatic events over the entire lifespan.

Excluded from this call are research projects on haemorrhage and hypoxia. Moreover, research on psychological/mental consequences of insults, including stress related disorders (e.g. post-traumatic stress disorder) is not part of the present call. Research on neurodegenerative disorders will not be eligible in the present call.

The ERA-NET NEURON funding organizations particularly wish to promote **multi-disciplinary work** and to encourage **translational research proposals** that combine basic and clinical approaches, for the benefit of the affected patients.

Research proposals should cover at least one of the following areas:

a) Fundamental research investigating consequences of external insults to the central nervous system on a biological and functional level. This may include the development of innovative or shared resources, and new technologies for the prediction, prevention or therapy of disease.

b) Clinical research, including the exploitation of novel and/or existing clinical data sets, to develop new strategies for diagnosis, therapy, and technology-driven neurorehabilitation (e.g. brain computer interfaces, EEG and neuroimaging approaches) for diseases after external insults to the central nervous system.

Only original and novel research projects will be funded. Applicants should align with existing international platforms and research programmes (e.g. International Initiative for Traumatic Brain Injury Research, InTBIR), where appropriate and proposals should build on research data and knowledge already available in the field, where relevant. The individual components of joint applications should be complementary and contain novel, ambitious ideas to answer key questions. There should be a clear added value in funding the collaboration over the individual projects.

Clinical studies up to the point of proof of concept are eligible for funding[1].

3. Application

3.1 Eligibility

Joint transnational research proposals may be submitted by research teams working in universities (or other higher education institutions), non-university public research institutes, hospitals, as well as in commercial companies, particularly small and medium-size enterprises. The eligibility of the afore-mentioned institutions, together with details of eligible costs (e.g. personnel, material, consumables, travel money, investments), are subject to the administrative requirements of individual funding organizations and will therefore differ. Please note that, for some funding organizations, commercial companies are not eligible or are only eligible under certain conditions (e.g. only in partnership with academic institutions in the consortium). Clarification should be obtained from the individual funding agencies (see contact details below).

Only transnational projects will be funded. Each consortium submitting a proposal must be comprised of a minimum of three research groups eligible for funding by organizations listed in this call text (see above). The research groups must be from at least three different countries. The total number of research groups in a consortium is limited to five. Not more than two research groups can be from the same country.

[1] Eligibility and funding requirements for clinical trials vary between the partner countries. Clarification may be obtained from the individual funding agencies.

The ERA-NET NEURON strives to strengthen the European Research Area by including as many partner countries as possible in its funding scheme. Therefore, consortia including partners from countries that are to date underrepresented in this funding scheme (Latvia, Romania, Slovakia, and Turkey) may increase the total number of partners to six.

Research groups not eligible to their national funding organizations or from countries which are not involved in this call may participate in projects only if their participation clearly provides an added value to the consortium and if they present evidence on secured budget for their part in the project. In any case, the total number of research groups in one consortium must not exceed five, or six if one of the underrepresented countries listed above is comprised.

Each consortium should have the critical mass to achieve ambitious scientific goals and **should clearly demonstrate added value** from working together. Each project must nominate a project co-ordinator who represents the consortium externally and is responsible for its internal management (e.g., the application procedure, the consortium agreement, reporting). It is mandatory that the co-ordinator of a consortium is eligible to be funded by one of the organizations listed in this call text.

Only projects that fulfil the legal and ethical international/EU and national and institutional standards will be funded. Funding for this kind of projects will be dependent on a positive vote from the responsible ethical and legal committee(s). All procedures involving human beings will conform to the Helsinki Declaration.

Although applications must be submitted jointly by groups from several countries, the individual research groups will be funded by the individual NEURON funding organization(s) of their respective countries. Eligibility criteria are the matter of individual partner funding organizations. In the context of the ERA-NET Cofund mechanism, additional/new criteria may apply.

Therefore, applicants are strongly advised to follow the instructions contained in the country-specific eligibility tables which are published on the NEURON website and to contact their national/regional funding organization to confirm eligibility matters before submitting an application.

3.2 Submission of joint transnational proposals

There will be a **two-stage procedure** for joint applications: **pre-proposals** and **full proposals**. In both cases, one joint **proposal document** (in English) shall be prepared by the partners of a joint transnational proposal, and must be submitted to the Joint Call Secretariat by one spokesperson, the co-ordinator.

Pre-proposals must be submitted in electronic format no later than **March 14, 2016** (14:00:00 CET) via the **electronic submission** system.

Any fundamental changes between the pre- and full proposals concerning the composition of the consortia, objectives of the project or requested budget will be accepted on permission of the Call Steering Committee, which may be granted in exceptional cases if detailed justification is provided to the Joint Call Secretariat.

NOTE: Full proposals will be accepted only from those applicants **explicitly invited** by the Joint Call Secretariat to submit them.

3.3 Further information

For further details, please refer to the respective submission forms available through the NEURON web site. If you need additional information, please contact the Joint Call Secretariat, or the representative of your funding organization (see Annex for contact data).

4. Evaluation and decision

The review process will be in two stages.

4.1 Formal check of proposals

The Joint Call Secretariat will check the proposals to ensure that they meet the call's formal criteria (e.g., date of submission; number of participating countries; inclusion of all necessary information in English). The Joint Call Secretariat will also forward the proposals to the national/regional funding organizations, which will perform a formal and eligibility check of compliance with their respective regulations. Proposals not meeting the formal criteria will be rejected at this stage.

The Call Steering Committee may reject proposals if they are clearly outside the scope of the call.

Proposals passing these check points will be forwarded to the joint Peer Review Panel for evaluation.

4.2 Peer-review of proposals

The reviewers will assess if the projects are within the scope of the call and carry out the evaluation according to specific evaluation criteria:

4. Excellence
    - Scientific quality of the approach and methodology
    - Novelty of the scientific concept/hypotheses
    - Competence and experience of participating research partners in the field(s) of the proposal (previous work in the field, specific technical expertise)
5. Impact
    - Potential impact of the expected results on clinical and other health related applications
    - Added-value of transnational collaboration
6. Quality and efficiency of the implementation
    - Feasibility of the project
    - Coherence and effectiveness of the work plan, including appropriateness of the allocation of tasks, resources, time-frame and related risk analysis
    - Quality and added-value of collaborative and multi-disciplinary interactions within the consortium
    - Appropriateness of the management structures and procedures

4.3 Decision

4.3.1 Pre-proposals

Eligible pre-proposals will be reviewed using the above mentioned evaluation criteria via a written (remote) peer review process. Based on the scores in the written reviews a ranking list will be set up. Preferably, each pre-proposal will be reviewed by at least three reviewers. By mid May 2016, the co-ordinators of the selected proposals will be invited by the Joint Call Secretariat to submit a full proposal **no later than June 30, 2016, 14:00 CET**.

4.3.2 Full proposals

The international Peer Review Panel will evaluate the full proposals based on the above mentioned evaluation criteria and establish a ranking list of the fundable proposals by scientific assessment. Based on this ranking list the Call Steering Committee will determine the projects to be funded in compliance with EU Cofund regulations, taking into account the national budgets available. Based on these recommendations, final decisions will be made by the funding agencies and will be subject to budgetary considerations.

5. Funding procedure / Responsibilities / Reporting requirements

5.1 Funding procedure

Projects can be funded for a period of up to three years and according to funding organizations' regulations. Funding is expected to start **early in 2017**.

Successful research groups will be funded directly by the respective funding organizations.

Funding will be administered according to the terms and conditions of the responsible funding organizations, taking into account all other applicable regulations and legal requirements.

5.2 Responsibilities

Within a joint proposal, each group leader will be the contact person for the relevant national/regional funding organization. The co-ordinators of funded projects together with the respective funding organizations shall make every effort to seek a common start date for all research groups in the consortium.

After the evaluation and selection procedures are completed, each consortium selected to be funded is required to draft and sign a Consortium Agreement (CA) suitable to their own team. The CA will determine a common project start date, manage the delivery of project activities, finances and intellectual property rights (IPR), and avoid disputes which might be detrimental to the completion of the project. All consortia are strongly encouraged to sign the CA before the official project start date; the CA must be signed within the first six months after the project start date.

5.3 Reporting Requirements

On behalf of the research consortium, the project co-ordinator will be required to submit a brief annual scientific progress report on the project and one final report in the end, to the Joint Call Secretariat. Group leaders may be required to submit reports separately to their national funding organization; reporting guidance will be forwarded by the relevant funding organization, as applicable.

Annual reports should be submitted by April-30 the following year. Annual reports do not need to be submitted if the project ends in the first three months of the following year (i.e. between January and March). In this case, the submission of a final report will suffice. However, instead of submitting the final report within the usual six month period (see below), the final report will be required within four months of project completion.

The deadline for submitting final reports is six months after the end of the project. It is the task of the co-ordinators to determine a formal end date for project completion. This is required, as partners may be granted extensions of differing duration. Co-ordinators will be informed about this procedure by the Joint Call Secretariat and will receive the report template in due course.

The co-ordinators will be asked to present a progress report during an intermediate status symposium. The attendance is obligatory for all co-ordinators and Principal Investigators (PIs). Accordingly, travel expenses to attend the symposium should be encumbered in the proposal budget plans. Early-career scientists working on the projects are welcome to join the status symposium together with the PIs.

Funding recipients must ensure that all outcomes (publications, etc.) of transnational NEURON projects include a proper acknowledgement of ERA-NET NEURON and the respective funding partner organizations, and are in line with the relevant publication requirements.

Annex II Questionnaire / Impact of the Project

IV. Questionnaire / Impact of the Project

This section will be used by ERA-NET NEURON partner organisations to analyse the joint call results. Information from this questionnaire **may be published** for reporting the call output.

Q.1 Publications and communications

Please indicate the number of publications and communications in which **NEURON support was acknowledged**. Publications in preparation or submitted must be indicated.

Do not include:

- **articles published before the project start date**
- **articles that do not acknowledge NEURON funding**

Q.1.1 Publications and communications

Type of publication	Total N°
Peer Reviewed Research Articles (acknowledging NEURON support)	
Peer Reviewed Review Articles (acknowledging NEURON support)	
Books or Book Chapters	
Dissemination Articles (to lay audiences, news articles, press releases etc.)	
Communications in Scientific Meetings	
Dissertations	
Others (letters to the editor, comments, responses, etc.)	

Add lines as appropriate

Q.1.2 List of publications and communications

A. List the publications resulting from the funded project.

Highlight the name of the NEURON partners and indicate the partner number according to the numbering designation in section I (e.g. partner 1 or P1). Please only add publications that acknowledge NEURON support and **provide a snapshot of the relevant acknowledgment section** for each of the listed publications.

No.	Publication Type (Article, Book)	Publication (authors, title, journal, year, issue, pp.)	PMID	DOI	Partner(s)	Impact factor	Open access (Y/N)
1							
PASTE ACKNOWLEDGMENT SNAPSHOT HERE							
2							
PASTE ACKNOWLEDGMENT SNAPSHOT HERE							
3							
PASTE ACKNOWLEDGMENT SNAPSHOT HERE							
4							
SUBMITTED / IN PREPARATION							

Add lines as appropriate

B. List of other communications of NEURON funded project

List presentations to scientific congress (oral and poster), institutional lectures, seminars, workshops, summer schools, etc.

Presentation Number	Presentation Type (Oral, poster)	Venue (congress/meeting, date and location)	Partner(s)	Invited (Y/N)
1				
2				
3				
4				

Add lines as appropriate

Q.1.3 *Has the consortium communicated "negative results" as an outcome of the project?*

YES ☐ NO ☐

►**If YES**, please **(i) indicate** the publication numbers concerned (table above) **(ii) specify** the nature of those negative results (e.g. a murine transgenic model without phenotype):

…

Q.2 Prizes and awards

Q.2.1 *Have any prizes or awards been received for the work funded in this project?*

YES ☐ NO ☐

►**If YES**, please detail **(i)** the name of the award and organisation that confered it, **(ii)** the individual who received it, and **(ii)** the work for which it was confered:

…

Q.3 Patents and other outputs with impact to health

Q.3.1 List of patents/licences

Please indicate if details regarding the listed patents need to be treated confidentially

Please indicate the project partners involved using the numbering designation in section I (e.g. partner 1 or P1)

Patent/licence description (patent no., name, description)	**Stage** (deposited/granted)	**Main partner**	**Partner(s) involved**

Add lines as appropriate

Q.3.2 List of other outputs with impact to health

Please list below:

Category	**Description**	**Partner(s) involved**
Software or Prototype		
Launching a product or service		

Creation of a platform available to a community		
Creation of an enterprise (Startup/SME)		
fundraising		
Other (please specify)		

Q.3.3 Data management

Has a Data Management Plan been produced? YES ☐ NO ☐

If yes, do you intend to publish this plan? YES ☐ NO ☐

►**If YES**, please provide the link:

From JTC2019 onward the default is that NEURON will publish the final DMPs after termination of the projects.

Please list below how the consortium stored, treated and gave access to the data generated

Category	Description	Accessible by whom?	Partner(s) involved
Database or Registry			
Data Repository or Storage			
Data harmonization or simplification for international standards			
Other (please specify)			

Q.4 Consortium collaboration and sustainability

Please tick when applicable

Q.4.1 Have the partners participating in the NEURON project collaborated before applying to this NEURON call? YES ☐ NO ☐

►**If YES**, please indicate which partners collaborated (e.g. partner 1 with partner 2, partner 3 with partner 5):

…

Q.4.2 Has the development of the project funded by NEURON motivated the establishment of new collaboration(s) with other team(s)? YES ☐ NO ☐

►**If YES**, please name the institutions and countries and specify the collaboration:

…

Q.4.3 Has the consortium collaboration led to new applications/grants in other funding programmes? YES ☐ NO ☐

►**If YES,** please specify the partners involved and the corresponding programme (e.g. partners 1 , 3, and 4: HORIZON 2020 call xy) :

…

Q.4.4 Intensity of collaboration: Meetings, human mobility and training within the consortium

A. Collaboration meetings (Involving at least two consortium partners)

Description (type of meeting, location, date)	**Partners present**

Add lines as appropriate

B. Please list **all non-permanent personnel** involved in the project.

Partner	**Position** (PhD Student, Technician, Postdoc, PI…)	**Gender**	**Last degree obtained**	**Employed using NEURON funds?**

C. Training and mobility between partners

Please indicate the nature and duration of personal exchanges between consortium partners, based on NEURON funding.

Partners involved (from X to Y)	**Position** (PhD Student, Technician, Postdoc, PI, etc.)	**Purpose of the exchange**

Q.5 Development of innovative or shared resources and technologies

Q.5.1 Has the consortium created a new or further developed an existing transnational…

Patient registry ☐ Patient database ☐ Biobank ☐ N/A ☐ ?

►**If YES, please complete** (repeat this section as many times as necessary):

- Name of the registry/database/biobank: …
- How was the registry/database/biobank created?

  Totally new set-up ☐ By compiling existing national sources ☐
- How were new patients recruited?
  - Via existing network of clinicians ☐
  - Through the development of NEW networks of clinicians ☐
- Please specify how the registry/database/biobank will be maintained/financed after the end of this project: …
- Is the the registry/database/biobank in open acces?

Q.5.2 Have the consortium partners exchanged resources?

Biological samples (DNA, RNA, tissue samples, cell lines, etc.) ☐

Viral vectors ☐

Reagents (indicators, chemical compounds, etc.) ☐

Animals ☐

Clinical data ☐

N/A ☐

►**If YES, please specify:**

- Have the shared samples allowed common studies? YES ☐ NO ☐
- Did the number of samples suffice to reach the goal? YES ☐ NO ☐
- Are data / materials made openly accessible (beyond the consortium) YES ☐ NO ☐
  If yes, please specify: …

Q.6 Potential health impact / achievements

Please list the major acheivements of the consortium.

Achievements		Brief description of achievement	Expected impact (research, policy, etc.) treatment,
Identification of new genes	☐		
Development of innovative screening systems	☐		
Identification and characterisation of biomarkers	☐		
Validation of biomarkers	☐		
Generation of novel model systems (animal or cellular)	☐		
Development of innovative therapies	☐		
New medical treatments	☐		
New medical devices	☐		
Neurosurgical innovation	☐		

Rehabilitation procedures	☐		
Prevention	☐		
Other (please specify)	☐		

Add lines as appropriate

Q. 7 Patient engagement

Were patients/patient representatives involved in planning and/or conducting the research project?
YES ☐ NO ☐

►If YES, please specify:

- designing the research project ☐
- conducting / coordinating the research project (e.g. patient committee / advisory board) ☐
- analysing / interpreting research data ☐
- dissemination of results ☐

►Please briefly describe the patient engagement:

…

►If NO, please explain why patients were not involved:

…

Number of achievements per consortium

Indicator/Measure	AxonRepair	ELPIS	KidBrainIT	Micronet	RepImpact	TRAINS	CERMOD	REACT-NSC	TAI-MRI	SiMPly Rehal	hMRIofSCI	LEAP	RATER-SCI	ICON-TBI	ACROBAT	NEURONICH	SILENCE	BIO-AX-TBI	SCI-NET	TOTAL
New consortium	0	0	0	1	1	0	1	0	0	0	1	0	0	0	0	1	0	0	1	6
Widening?	1	0	1	1	1	1	0	0	0	0	1	1	1	0	0	1	1	0	0	10
subsequent applications jointly 2 members	0	0	1	0	1	1	0	1	0	0	0	0	0	1	1	1	0	1	0	8
Intensity of Collaboration																				
total number of meetings	5	3	10	2	1	10	2	3	24	5	4	6	3	4	5	4	16	11	13	131
meetings all partners	5	1	4	2	1	0	2	3	16	5	2	3	0	4	0	2	4	11	5	70
Excellence																				
TOTAL (includes books & reviews & others)	25	1	8	21	8	14	7	1	9	3	44	7	18	7	20	21	29	4	14	261
Multi Partner publi (joint publication)	4	1	4	0	4	1	0	1	0	3	21	6	3	3	1	1	2	2	1	58
numbr of journals IF > 10	9	0	0	5	0	0	0	0	0	0	13	0	6	0	3	4	4	1	5	50
Composition of consortia																				
coordinator is a medical doctor	0	1	0	0	1	0	0	0	1	0	1	0	0	0	0	0	1	1	0	6
number of medical doctors	0	0	4	1	2	3	1	0	3	1	2	1	1	4	1	0	4	5	1	34
basic research labs involved	6	3	0	4	4	6	3	4	4	2	4	5	5	2	4	5	3	2	4	70
clinical research labs involved	0	0	3	1	2	0	1	0	0	2	2	0	0	2	0	0	2	3	0	18
hospitals involved	0	0	1	0	0	0	0	0	1	2	0	0	0	2	1	1	0	2	0	10
Patient involvement	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	3
Patents (submitted or obtained)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
other outcomes with impact to health	0	1	1	0	1	0	0	0	1	1	1	0	0	0	0	0	0	0	0	6
Databases/registries/biobanks created	0	0	1	0	1	1	0	0	1	1	1	1	1	0	0	0	1	1	0	10
Exchange of:																				
DNA	1	1	0	1	0	1	0	1	0	0	0	1	0	1	1	1	1	1	1	12
tissues	1	1	0	1	0	1	0	1	0	0	0	1	0	1	1	1	1	1	1	12
cells	1	1	0	1	0	1	0	1	0	0	0	1	0	1	1	1	1	1	1	12
animals	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	2
reagents	0	0	0	1	0	0	1	0	0	0	0	1	0	0	1	1	1	0	0	6
Clinical / Patient Data	0	0	1	0	0	0	0	0	1	1	1	0	1	1	0	0	1	1	0	8
experimental data	0	0	0	0	1	1	0	0	0	1	0	0	0	0	0	0	0	1	1	5
Other 3 (please specify)	2	1	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	3
Novel strategies for:																				
diagnosis	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	1	0	3
Therapy (preparation of Clinical Trials)	0	1	0	0	0	0	0	0	0	1	0	0	1	0	0	0	1	0	0	4
Rehabilitation procedures	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	2
prevention	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other (please specify)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Major achievements:																				
Identification of genetic components	0	0	0	0	0	1	0	1	0	0	0	0	0	1	0	1	0	0	1	5
Development of innovative screening system	0	0	0	0	0	0	0	0	1	1	0	0	0	1	0	0	1	0	1	5
Biomarkers: identification / characterisation	0	0	0	0	1	1	0	0	1	0	0	1	0	1	0	0	1	1	1	8
Biomarkers: validation	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	1	1	4
Generation of novel model systems	0	0	0	0	0	1	0	0	0	0	0	7	0	0	0	0	0	0	0	1
innovative therapies * 2	1	1	1	0	0	1	1	1	0	1	0	1	1	1	1	1	0	0	1	13
new medical treatments	0	1	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	4
new medical devices	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	2
neurosurgical innovation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
Other 2 (please specify)	0	1	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	3