The Future of European Brain Research

#COSTconnect

19 - 20 November 2018

COST Association
Avenue Louise 149, 1050 Brussels, Belgium

Content table

Programme

Avenue Louise 149, 15th floor, 1050 Brussels

19 November 2018

Networking lunch	*12.00 – 13.00*
1. **Introduction and welcome** Welcome words by the organisers	13.00 – 13.10
2. **Welcome round and check-in** All participants briefly introduce their work	13.10 – 13.40
3. **Setting the Scene** Brief input on the current state-of-play	13.40 – 15.00
Coffee break	*15.00 – 15.20*
4. **Announcing, discussing and selecting questions** People bring forward their question with the offer to host a discussion table. After all tables have been chosen by someone sharing a question, the other participants are invited to think about which table they want to join first.	15.20 – 16.00
5. **Pro-Action Café round 1: What is the quest behind the question** Every participant is invited to challenge the table host and different facets of the question are explored.	16.00 – 17.00
6. **Pro-Action Café round 2: What is missing** The participants aim to make the picture more complete, redefine and deepen the discussion on the question (e.g. questions not asked yet, perspectives or options not considered yet).	17.00 – 18.00
*All participants are kindly invited to a **networking dinner at Rouge Tomate*** *Avenue Louise 190, 1050 Brussels*	*19.30*

20 November 2018

Welcome breakfast	*08.30 – 09.00*
7. **Recap on Day 1**	09.00 – 09.15
8. **Pro-Action Café round 3: What is next** What did we learn? What next steps will each of us take? What are possible actions?	09.15 – 10.15
Coffee break	*10.15 – 10.30*
9. **Presentation of results** Presentation of the results by the hosts of the tables	10.30 – 11.30
10. **Next steps and closing of the meeting**	11.30 – 12.15
Networking lunch	*12.00 – 13.00*

The Future of European Brain Research - Background

One of the great scientific challenges is to understand the human brain and its complexity. Brain disorders (mental and neurological disorders) represent 35% of Europe's total diseases burden and a study carried out in 2010 estimated that this burden has a global cost of 800 billion euros in Europe a whole, it is needed to enhance cross-border cooperation building on complementarities and coordination in research to avoid duplication of efforts and accelerate results.

While advances in neuroscience and neurotechnology offer major opportunities for health innovation and societal benefit, they also present key challenges and barriers to effective integration of research and policy results. This COST Connect will provide a platform for fostering common understandings across various research initiatives in the field of brain research. The event aims to identify and address knowledge gaps in brain research and coordinate research and innovation activities at a European level, by bringing together relevant stakeholders to provide relevant perspectives and share good practices. An important objective is to enhance collaboration between researchers, innovators and policy makers from the fields of neuroscience, psychiatric genetics, psychosocial research, psychiatry, psychology, medical genetics, molecular sciences, chemistry, computing and robotics.

This COST Connect will provide an opportunity for leaders from across sectors to discuss and assess various aspects of innovation in the field, with the objective to improve and accelerate policy impact of research and innovation results in the area. Following an interactive format, participants are encouraged to explore possible recommendations on future research agendas in the field of brain research to provide targeted advice for policy-makers with regard to the upcoming discussions on Horizon Europe. In this context topics for discussion could include translating outstanding and clinically relevant projects into medically-valuable applications; exploring lead structures for drug development, offering valuable new opportunities for European pharmaceutical research and industry; strengthening information systems, evidence and research for brain research and related policy fields.

COST has been creating networks of excellence in all scientific fields for more than 45 years, where knowledge is widely shared among different types of specialists, using bottom-up principles. Participants are active in various disciplines and include a variety of companies and stakeholders such as European and international organisations. COST nourishes free and open spaces where people and ideas can grow. This helps to internationalise the scientific community and leads to true breakthroughs in science and technology in Europe and beyond.

COST allows researchers and scholars to create interdisciplinary networks, the so-called 'COST Actions', where they can develop their own ideas. COST Actions are completely bottom-up and implement workshops and conferences, training schools, short-term scientific missions and dissemination activities.

Objectives of the workshop

COST organises this highly interactive COST Connect event series to bring together representatives of COST Actions as well as scientific communities, stakeholders and policy makers working on the broader topic of sustainable energy.

The event will help to:

- Strengthen effective leadership and governance for brain research;
- Fight against dispersion of resources and fragmentation of research activities;

- Support the cooperation of COST Actions with relevant stakeholders in the field of brain research;
- Encourage collaborations between relevant stakeholders and trigger alignment of resources to develop research and innovation on brain research;
- Promote synergies between activities funded through other EU programmes;
- Provide networking opportunities for all partners involved;
- Promote joint activities including proposition for open calls;
- Propose effective mechanisms for data sharing and knowledge exchange.

In this particular case, the potential questions to be answered are structured around the identification of future research cooperation and funding opportunities, the promotion of COST Actions strategic research roadmaps and the identification of priorities for Horizon Europe. Furthermore, the discussions will build on COST experiences, bridging the research and innovation divide in Europe.

Methodology of the workshop

The methodology of the workshop is based on the concept of the Pro-Action Café, which is a methodology for creative and inspirational conversations. Participants are invited to share their questions (around projects – seed ideas) and get group input (deeper questions – knowledge – experience) from others. A Pro-Action Café is an innovative yet simple methodology for hosting conversations about questions, projects, and concerns that matter to the individuals that attend.

In a Pro-Action Café, topics are brought forward by participants themselves. There is no set agenda, only overall guiding questions and “setting-the-scene” presentations with the intention of deepening the learning process of all participants.

After the Introduction and the “setting-the-scene” presentations, there are three rounds of conversation in café style – each guided by a few generic questions to help deepen and focus the conversations. In each round, a new set of participants join the tables, benefiting from the collective intelligence present during the event.

About COST

European Cooperation in Science and Technology (COST) is an EU-funded programme that enables researchers and innovators to set up their interdisciplinary research networks in Europe and beyond. Currently COST has 38 Members and a Cooperating Member. Funds are provided for organising conferences, meetings, training schools, short-term scientific exchanges or other dissemination activities across a wide range of scientific topics.

COST provides a unique way to jointly develop ideas and new initiatives across all science and technology fields, including social sciences and humanities, through pan-European networking of nationally-funded research. As a European intergovernmental framework, since its creation in 1971, COST has been helping to bring together researchers and stakeholders from public and private institutions, NGOs, industry and SMEs across Europe and beyond, thereby playing a very important role in building the European Research Area (ERA).

COST anticipates and complements the activities of the EU Framework Programmes, acting as a bridge to the less research-intensive communities in some COST Members defined as Inclusiveness Target Countries. It also enhances the mobility of researchers across Europe and fosters scientific excellence.

The COST Association, an international not-for-profit association under Belgian Law, integrates all management, governing and administrative functions necessary for the operation of the COST Programme.

www.cost.eu

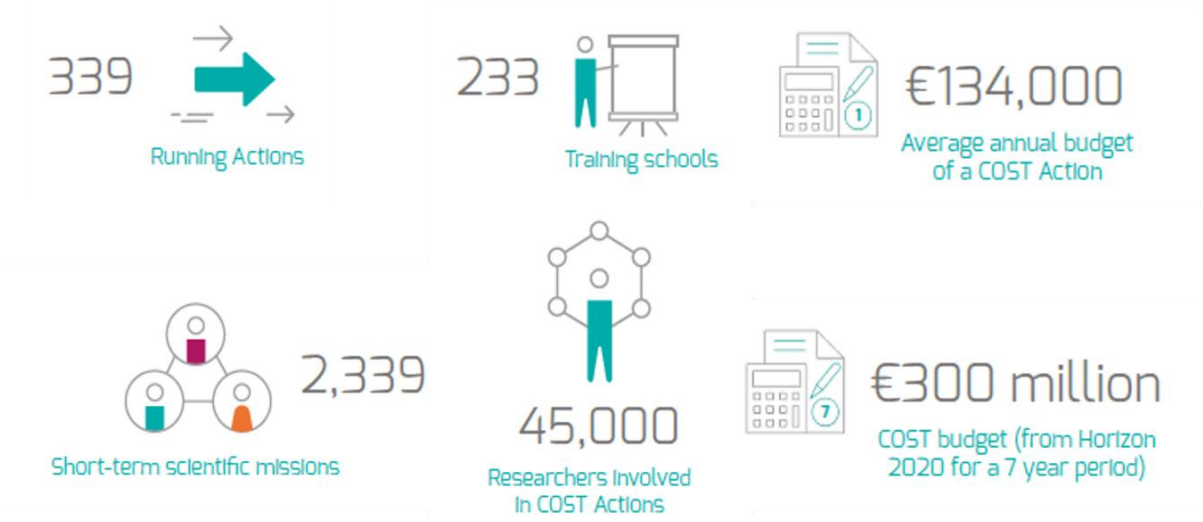

Figure 1 Data throughout the year 2017

About COST Actions

COST Actions are interdisciplinary networks of researchers and innovators from universities, public and private institutions, NGOs, industry and SMEs. Although we pride ourselves on funding networks on high-risk, innovative and emerging research themes, COST does not set research priorities. These networks can touch on any science and technology topic.

COST Actions can also pave the way to establish synergies with EU-funded research projects. Moreover, collaboration within research projects can also lead to new Actions, thus enhancing the networking potential of such consortia. Every COST Action has an objective, defined goals and clear deliverables. These are described in a Memorandum of Understanding, accepted by at least seven participating COST Members.

On the basis of mutual benefit, researchers and innovators from Near Neighbour Countries and International Partner Countries may join.

You can browse through all the running COST Actions[1] on the COST website.

COST Actions are:

- **Pan-European and beyond**
  Spanning 38 Members and a Cooperating Member.

[1] www.cost.eu/COST_Actions/all_actions

- **Researcher-driven**
  In terms of proposed topics, objectives and work organisation; researchers choose their own topics and all decisions are entrusted to the Action's Management Committees.

- **Open and inclusive**
  Open to everyone, irrespectively of their gender, field of research or career stage. Actions can expand with researchers from new countries during their lifetime.

- **Multi- and interdisciplinary**
  Building, bridging and expanding multi- and interdisciplinary science and technology research communities.

- **Future-oriented**
  Engaging the next generation of young researchers.

- **Lightweight**
  They are a light platform to coordinate national research funding through easy networking tools and simple rules.

COST Actions represented – Overview

	Code	Name	Links
1	BM1001	Brain Extracellular Matrix in Health and Disease (ECMNet)	www.cost.eu/actions/BM1101
2	BM1203	EU-ROS	www.cost.eu/actions/BM1203
3	BM1307	European network to integrate research on intracellular proteolysis pathways in health and disease (PROTEOSTASIS)	www.cost.eu/actions/BM1307 cost-proteostasis.eu
4	BM1402	Development of a European network for preclinical testing of interventions in mouse models of age and age-related diseases (MouseAGE)	www.cost.eu/actions/BM1402 www.mouseage.eu
5	BM1406	Ion Channels and Immune Response toward a global understanding of immune cell physiology and for new therapeutic approaches (IONCHAN-IMMUNRESPON)	www.cost.eu/actions/BM1406 costbm1406.univ-tours.fr/
6	CA15111	European Network on Myalgic Encephalomyelitis/Chronic Fatigue Syndrome (EUROMENE)	www.cost.eu/actions/CA15111
7	CA15120	Open Multiscale Systems Medicine (OpenMultiMed)	www.cost.eu/actions/CA15120
8	CA15133	The Biogenesis of Iron-sulfur Proteins: from Cellular Biology to Molecular Aspects (FeSBioNet)	www.cost.eu/actions/CA15133 www.fesbionet.eu
9	CA15135	Multi-target paradigm for innovative ligand identification in the drug discovery process (MuTaLig)	www.cost.eu/actions/CA15135 www.mutalig.eu
10	CA15214	An integrative action for multidisciplinary studies on cellular structural networks	www.cost.eu/actions/CA15214 www.eurocellnet.eu
11	CA16102	European Network on Individualized Psychotherapy Treatment of Young People with Mental Disorders	https://www.cost.eu/actions/CA16102 www.treat-me.eu
12	CA16118	European Network on Brain Malformations	www.cost.eu/actions/CA16118 www.neuro-mig.org
13	CA16210	Maximising Impact of research in NeuroDevelopmental DisorderS	www.cost.eu/actions/CA16210
14	CA17103	Delivery of Antisense RNA Therapeutics	www.cost.eu/actions/CA17103

15	CA17130	Enhancing Psychiatric Genetic Counselling, Testing, and Training in Europe	www.cost.eu/actions/CA17130
16	CM1103	Structure-based drug design for diagnosis and treatment of neurological diseases: dissecting and modulating complex function in the monoaminergic systems of the brain	www.cost.eu/actions/CM1103
17	CM1207	GLISTEN: GPCR-Ligand Interactions, Structures, and Transmembrane Signalling: a European Research Network	www.cost.eu/actions/CM1207
18	CM1403	The European upconversion network - from the design of photon-upconverting nanomaterials to biomedical applications	www.cost.eu/actions/CM1403 www.ucnp.eu
19	IC1401	Memristors - Devices, Models, Circuits, Systems and Applications (MemoCiS)	www.cost.eu/actions/IC1401 www.memocis.eu
20	TD1006	European Network on Robotics for NeuroRehabilitation	www.cost.eu/actions/TD1006
21	TD1405	European Network for the Joint Evaluation of Connected Health Technologies (ENJECT)	www.cost.eu/actions/TD1405 www.enject.eu

Brain Extracellular Matrix in Health and Disease (ECMNet) – BM1001

The objective of this Action is to understand the rapidly emerging role of the neural extracellular matrix (ECM) in brain function and dysfunction, by synergising European research in this multidisciplinary domain. The synergy is essential to study complex interaction between ECM, neurons and glial cells, which have historically represented separate fields of science. This Action will be instrumental to address the following scientific questions: what are the functional properties of different ECM components in the brain, which new research tools are in need to study neural ECM, which ECM molecules are linked to brain disorders, which drugs can target them, and how to synthesize three dimensional ECM scaffolds that would mimic specific forms of neural ECM and guide reconstitution of neural circuits. The future economic/societal benefits from this Action will be development of novel ECM-based therapeutic strategies for major neurological, neurodegenerative and neuropsychiatric disorders, such as epilepsy, traumatic brain injury, dementia, schizophrenia, and mental retardation.

Runtime 2010 – 2014, 20 COST countries & 1 Near Neighbour Country involved

MC Chair: Prof. Alexander DITYATEV (DE)

MC Vice-Chair: Prof. Leszek KACZMAREK (PL)

EU-ROS – BM1203

Life requires oxygen. This runs the risk that, when oxygen leaks out from normal metabolism, reactive oxygen species (ROS) are formed, which - when too high - trigger disease. With the idea to overcome this, antioxidants are heavily marketed, yet without proof of their effectiveness. Rather, worrying evidence suggests adverse effects. This paradox is due to the fact that ROS are not only 'bad', but - in

tightly regulated amounts - also act as essential signalling molecules. Unravelling the fine balance between ROS acting as a friend or a foe is fundamental to understand aerobic life. To advance this important area of biology and medicine, highly synergistic approaches combining diverse and scattered disciplines are needed. For this, COST provides an ideal framework. EU-ROS will bring together multi-disciplinary experts to enhance the competitiveness of European research. By applying fundamentally new approaches it will generate advanced knowledge and translate this into novel applications ranging from medicine to crop science. With its dynamic structure, EU-ROS will attract further experts and particularly support capacity building of the future European research leaders and talented women. Collectively, EU-ROS will overcome the fragmentation of European R&D on oxygen/ROS research while its translational components will contribute to European societies' economic growth and wellbeing.

Runtime 2012 – 2016, 34 COST countries & 2 Near Neighbour Countries involved

MC Chair: Prof. Andreas DAIBER (DE)

MC Vice-Chair: Prof. Fabio DI LISA (IT)

European network to integrate research on intracellular proteolysis pathways in health and disease (PROTEOSTASIS) – BM1307

Intracellular proteolysis is critical for cell homeostasis and to prevent pathologies such as cancers, immune diseases and neurological disorders. Its involvement in the control of almost every biological process has generated a huge interest amongst scientists from very diverse backgrounds, which in turn has resulted into both a tremendous advance of our knowledge and an important fragmentation of the field. The Action will coordinate and integrate the efforts made by European research teams to better understand intracellular proteolysis and to translate novel discoveries into products of clinical and/or economical values. It will gather all European academic, clinical and industrial partners willing to foster collaboration and training in the field through the organization of meetings, workshops and exchange programs. The implementation of different translational projects within the network will generate a "mind-agitating" atmosphere that will promote both creativity and reactivity. To help overcome the energy-barrier that too often limits development of novel and original ideas and concepts, a core dedicated think-tank created within PROTEOSTASIS will detect outstanding and clinically relevant projects that cannot be productively tackled by individual teams and help to assemble both the appropriate funding and workforce required to translate them into medically-valuable applications.

Runtime 2014 – 2018, 27 COST countries & 1 Near Neighbour Country involved

MC Chair: Dr Rosa BARRIO (ES)

MC Vice-Chair: Dr Olivier COUX (FR)

Development of a European network for preclinical testing of interventions in mouse models of age and age-related diseases (MouseAGE) BM1402

The number of people over 65 is predicted to double in the next 50 years. Age is the most important risk factor for stroke, heart attacks, cancers, diabetes, and many other chronic diseases. Tackling the effects of the ageing population in Europe has stimulated funding of research initiatives at both national and European levels. A key requisite to develop new interventions for age-related conditions and promote healthier ageing is the availability and use of preclinical murine models. There is currently a

clear lack of such models and appropriate standardised methodologies to test interventions. Therefore, to improve the quality of European ageing research a coordinated interdisciplinary action is needed to standardise methodologies and animal welfare, and to define endpoints, as well as centralising information, models and technologies for the assessment of interventions. This Action proposes to set up a highly interactive and flexible European network, which will create a critical mass of cross-disciplinary scientists, clinicians and industrial partners to reach consensus on ways to test preclinical interventions in ageing mice. It will consolidate current best practice across leading European institutions and researchers, maximise resource efficiency, and provide a platform to help train the next generation of scientists.

Runtime 2014 – 2018, 25 COST countries involved

MC Chair: Prof. Ilaria BELLANTUONO (UK)

MC Vice-Chair: Prof. Ralph MÜLLER (CH)

European Network on Myalgic Encephalomyelitis/Chronic Fatigue Syndrome (EUROMENE) – CA15111

Myalgic Encephalomyelitis/Chronic Fatigue Syndrome - ME/CFS - is a disabling condition of unknown aetiology that affects individuals of all ages. Disease is causing significant social and economic burden.

While there have been research efforts in the last 20 years on ME/CFS, they still remain rather fragmented, and there is clearly lack of coordination of European research on the topic. Action will provide clear benefits via coordination of research activities, support to development of common standards, database synchronisation, and promotion of new research projects in the area. Data depositories harmonisation and data collection protocol synchronisation can greatly improve use of existing data, including Open data sources, and allow the development of coherent research strategies.

Innovation will benefit from coordination of introduction of new technologies in this research area, experience on novel data analysis approaches, patient stratification and synergistic approach to existing data. All this will be supporting the development of translational platforms, which have a long-term potential of new product development addressing the challenge.

Early Carrier investigators will receive a special training package built on training schools, training workshops, clinical research introduction, STSMs. Researchers with high potential from other areas will enrich their scientific focus by interaction on events and obtaining dissemination materials produced by the Action. Inclusiveness countries will get special supportive measures, as many of them still lack streamlined research agendas on ME/CFS.

Runtime 2016 – 2020, 21 COST countries involved

MC Chair: Prof. Modra MUROVSKA (Latvia)

MC Vice-Chair: Dr Eliana LACERDA (UK)

Open Multiscale Systems Medicine (OpenMultiMed) – CA15120

Multiscale systems medicine assumes that the growing amounts of highly diverse (multiscale) data relevant to human health and disease are the key to address current and future medical challenges. Transforming these data into effective and economical medical solutions requires appropriate means

for multiscale data modelling, integration and analysis. The overarching aim of the **Open Multiscale Systems Medicine** (OpenMultiMed) COST Action is to gather a critical mass of international researchers and coordinate them as a team that develops and evaluates a transdisciplinary framework for multiscale systems medicine, consisting of novel concepts, methodologies and technologies. The unique concept and ambition of the OpenMultiMed Action rests on three pillars: (1) A **transdisciplinary** strategy in which medical researchers, mathematical modellers, data scientist, and computer scientists work jointly using a shared conceptual framework and combined disciplinary-specific approaches. (2) A strong focus on **multiscaleness** across systems medicine, multiscale modelling, multiscale data science and multiscale computing. (3) An **open-science** approach, making scientific research, data and dissemination in multiscale systems medicine accessible to all levels of an inquiring European and international society. The potential impacts resulting from the OpenMultiMed Action include more effective and economical ways of health promotion, disease prevention and therapy; more effective and efficient concepts, methods and tools for multiscale systems and data modelling, and multiscale computing; and a strengthening of scientific excellence and industrial competitiveness of individuals and organizations in medical, analytical and technological areas.

Runtime 2016 -2020, 34 COST countries involved

MC Chair: Prof. Harald SCHMIDT (NL)

MC Vice-Chair: Dr Ivan CHORBEV (FYROM)

The Biogenesis of Iron-sulfur Proteins: from Cellular Biology to Molecular Aspects (FeSBioNet) – CA15133

The importance of iron-sulfur (Fe/S) proteins for human life and the comprehension, at molecular and cellular level, of their biogenesis is documented by an increasing number of diseases linked to functional impairment of these proteins and of their maturation processes. Fe/S protein biogenesis needs to guarantee that the right metal reaches the right binding site in any subcellular compartments, through specific cellular pathways, which control the steps of Fe/S cluster assembly and transfer. This Action is an intersectoral, pan-European network to: address Fe/S protein biogenesis in living systems; investigate pathophysiological mechanisms underlying human diseases related to Fe/S protein biogenesis dysfunctions; provide a molecular view of Fe/S protein assembly processes and trafficking pathways in the context of the cellular metallomes. The Action will build a joined research agenda and a network with different expertise and infrastructures, henceforth it will be able to i) support Early Career Investigators and research groups from Inclusiveness Target Countries; ii) frame the research of individual groups within wider scenarios; iii) achieve scientific deliverables that could not be reached without knowledge and infrastructure sharing based approaches. The understanding of molecular mechanisms at the basis of Fe/S protein biogenesis needs to be addressed by a team of chemists, biologists and geneticists in order to provide a full picture of the possible and feasible cures to these genetic diseases. The Action will foster knowledge exchange among different areas, explore the intersection of fundamental science with applications, act as incubator for translational studies, diffuse good practice of gathering different expertise.

Runtime 2016 – 2020, 20 COST countries involved

MC Chair: Prof. Mario PICCIOLI (IT)

MC Vice Chair: Prof. Georgios A. SPYROULIAS (EL)

Multi-target paradigm for innovative ligand identification in the drug discovery process (MuTaLig) – CA15135

The aim of this COST Action is to join highly-qualified research teams working in disciplines around the field of medicinal chemistry, into a novel network devoted to the multi-target issue in drug discovery. The choice of this theme is related to its marked multidisciplinary character, which can ensure a strong interaction among all COST Action participants. Currently, an important and emerging issue in modern drug discovery is to design novel or identify existing bioactive compounds, endowed with the capability to interact selectively with two or more macromolecular targets, exerting their effects against certain therapeutic goals in a synergic fashion. This leading concept stimulated this COST Action focusing on novel ligands able to recognize selected multiple targets, to promote closer scientific links among European research groups involved in medicinal chemistry field at both academic and industrial level. The research competencies of the network will span around medicinal chemistry, from synthetic chemistry, natural products and biophysics to theoretical chemistry, molecular modelling and biological screening.

Runtime 2016-2020, 33 COST countries involved

MC Chair: Prof. Stefano ALCARO (IT)

MC Vice Chair: Prof. Fernanda BORGES (PT)

An integrative action for multidisciplinary studies on cellular structural networks – CA15214

Structural networks that connect the extracellular matrix and cell surfaces through the cytoskeleton with the nucleoskeleton govern cell, tissue and organ integrity. Besides their structural roles, these networks participate in a multitude of fundamental functions, e.g. regulating signal- and mechano-transduction, cytoplasmic transport, sequestering biomolecules, maintaining genome organization and promoting meiosis. Mutations in the building blocks of these networks frequently lead to devastating diseases. The pathogenesis of these diseases is far from being understood and requires a wide interdisciplinary approach that is distinct from the individual research schemes. Based on capacity building measures, coordinated networking and educative activities and interactions with business partners and European research infrastructures, the EuroCellNet Action aims to develop an orchestrated multinational activity grid, organized in four Working Groups: 1) Biophysics of cell and tissue structure, 2) Structural analysis of biomolecules involved in mechanobiology, 3) New methodologies to study mechanobiology of cells and tissues, and 4) Mechanobiological principles of rare and common diseases. The Action targets researchers from molecular and cell biology, genetics, biophysics, structural biology, mechanobiology, neurobiology, developmental biology, pathology, and translational medicine. The Action will also develop new bridging and educative activities and provide the scientists with a unifying dedicated website with on-line tools facilitating the interactions and exchange of information.

Runtime 2016 – 2020, 33 COST countries involved

MC Chair: Prof. Pavel HOZÁK (CZ)

MC Vice-Chair: Prof. Roy QUINLAN (UK)

European Network on Brain Malformations – CA 16118

Among congenital brain disorders, malformations of cortical development (MCD) are a group of rare diseases, but constitute a major cause of chronic epilepsy and psychomotor disability worldwide. Little is known about the natural history and no curative therapy exists. The etiology is mainly genetic, and rarely environmental or multi-factorial, but diagnosis requires special expertise among neurodevelopmental disorders. The emergence of novel neuroimaging and genomic technologies potentially allows rapid and accurate characterisation and gene discovery, but challenges scientists and clinicians of efficiently interpreting and translating these data for the benefit of patients. In Europe, expertise on MCD is very fragmented and confined to personal interest of a few experts and basic scientists studying cortical development are not always connected with clinicians. This COST Action will, for the first time, bring together clinicians and researchers in the field of brain malformations, to create the interdisciplinary, pan-European Network Neuro-MIG, advancing the understanding of MCD pathophysiology and translating this knowledge to improve the diagnostic and clinical management of the patients. This Action will harmonise MCD classification, based on the advances in genetics and neuroimaging, develop guidelines for clinical management, create best practice diagnostic pathways, coordinate databases from different countries to utilize them for collective research initiatives aimed at developing appropriate therapies, identify common pathophysiological mechanisms through collaborations, educate young clinicians and scientists, and stimulate translational and transnational exchange. This Action will join forces of MCD experts to reduce health care costs and increase the quality of life of the affected individuals and their families.

Runtime 2017 – 2021, 24 countries & 1 Near Neighbour Country involved

MC Chair: Dr Grazia M.s. MANCINI (NL)

MC Vice Chair: Prof. Anna JANSEN (BE)

Maximising Impact of research in Neurodevelopmental Disorders – CA16210

This Action focuses on patients with rare neurodevelopmental disorders (NDD) whose study have the potential for major impact on our understanding and treatment of NDD in general, including schizophrenia and Autism Spectrum Disorder (ASD). NDD affect 1 in 25 individuals in Europe, and have high impact on healthcare systems, economic development and society. Lack of mechanistic knowledge hampers development of improved treatments. New knowledge from psychiatric genomics provides for the first time a route to identify neurobiological mechanisms underlying NDD. The key challenge is to link genetic risk to altered brain biology.

Although highly informative, substantial variability and severity of psychiatric symptoms means that genomic studies based on the general NDD patient population experience significant difficulties in assigning individual gene mutations to clinical phenotype. A solution to this challenge is the study of subgroup of NDD patients where deletions or duplications of DNA segments (Copy Number Variants, CNV) alter gene dosage and have a strong causal relationship with NDD. These pathogenic CNV present a major opportunity to establish mechanistic understanding and develop new therapies. However, NDD patients with these CNV are rare and require a coordinated, international collaboration to find and study them in large numbers.

MINDDS will create a pan-European network of clinical scientists, preclinical researchers and patient representatives to advance studies of NDD patients for these pathogenic CNV. It will create a legal and ethical framework for effective transnational NDD patient cohort building; develop standardized protocols and establish effective mechanisms for effective data sharing and knowledge exchange.

Runtime 2017 – 2021, 28 COST countries involved

MC Chair: Prof. Adrian HARWOOD (UK)

MC Vice-Chair: Dr Marina MIHALJEVIC (RS)

Delivery of Antisense RNA Therapeutics – CA17103

Antisense oligonucleotides (ASOs) are a new class of drugs that, through very specific targeting, could correct genetic defects for rare inherited diseases, modulate autoimmune or neurodegenerative diseases or target tumors or viruses. However, only a few of such drugs are currently in the market and they have been less effective as expected. The main hurdle for their efficacy seems to be their deficient delivery to target tissues but, while translational research on ASO is surging, very little is known about the mechanisms by which ASOs are taken up by different tissues and specific cells.

Regarding delivery, the ASO field is fragmented, with researchers in academia and industry working in isolation on specific diseases, generally focusing on therapeutic effects in target tissues. The main aim of the Delivery of Antisense RNA ThERapeutics (DARTER) Action is to use networking and capacity building in the field of nucleic acid therapy delivery to allow RNA-targeting nucleic acid drugs to reach their full potential and become a mainstream therapeutic option.

DARTER will act through 3 Working Groups with research objectives (delivery strategies, model systems, safety and toxicology) and one capacity building group (stakeholder communication) with the objective of achieving consensus on protocols and assessment of ASO delivery and toxicology and training new researchers within a cooperative research framework. DARTER COST network will contain participants from COST countries and several international partners, including academics, industrial partners, patient representatives and clinicians and it is open to other interested stakeholders.

Runtime 2018 – 2022, 25 COST countries involved

MC Chair: Dr Virginia ARECHAVALA-GOMEZA (ES)

MC Vice-Chair: Prof. Annemieke AARTSMA-RUS (NL)

Enhancing Psychiatric Genetic Counselling, Testing, and Training in Europe – CA17130

The Action Enhancing Psychiatric Genetic Counselling, Testing, and Training in Europe (EnGagE) aims to strengthen pan-European research into the newly emerging disciplines of Psychiatric Genetic Counselling (PsyGC) and Psychiatric Genetic Testing (PsyGT); and to develop a framework to facilitate the implementation of both disciplines into routine clinical care.

Psychiatric disorders are common, with estimated life-time risks of around 1-3 % for schizophrenia, bipolar disorder, and major depressive disorder. The last decade has witnessed major advances in psychiatric genetics. Currently, no form of valid, high certainty diagnostic PsyGT is available in routine clinical practice. However, in view of recent genetic findings (particularly the identification of pathogenic copy number variants that are associated with high risks for schizophrenia), major efforts to establish such testing are now underway. The publication of the major advances in psychiatric genetics have received wide media coverage and awareness among patients and their family members of the role of genetics in psychiatric disorders is growing. An increased demand for high-quality information on psychiatric genetics likely provided in the form of PsyGC, is anticipated.

EnGagE is a knowledge-sharing and expertise-enhancing network comprising preclinical and clinical researchers from the fields of neuroscience, psychiatric genetics, psychosocial research, and ethics; clinicians from the fields of psychiatry, psychology, and medical genetics; genetic counsellors, and scientists from diagnostic genetic testing laboratories from Europe and beyond. EnGagE will establish a framework for PsyGC and PsyGT; develop standardised guidelines, practice recommendations and research protocols; share scientific knowledge and data and provide standardized training in PsyGC and PsyGT.

Runtime 2018 – 2022, 26 COST countries involved

MC Chair: Dr Franziska DEGENHARDT (D)

MC Vice-Chair: Dr Andrew CUTHBERT (UK)

Structure-based drug design for diagnosis and treatment of neurological diseases: dissecting and modulating complex function in the monoaminergic systems of the brain – CM1103

The therapy of neuropsychiatric disorders is limited by the high variability of symptoms and behavioural disturbances. Few drugs are available to address specific subsets of neurological/mental symptoms, and none to aid in diagnosis or to stop the progress of neurodegenerative disorders.

Neurotransmitters such as dopamine and serotonin play a central role in the pathophysiology of major neuropsychiatric illnesses, such as anxiety and mood disorders, schizophrenia, autism-spectrum disorders, Parkinson's disease, epilepsy, and dementias. Neurotransmitter-binding proteins such as receptors, transporters and common metabolic enzymes are the starting points for development of tools to diagnose and drugs to treat specific clusters of symptoms.

Structure-based drug design, synthetic chemistry and biological characterisation will inform the choice of lead compounds to treat select subsets of brain malfunction. COST collaboration facilitates the cross-disciplinary interaction for discovery of promiscuous drugs for diagnosis and treatment of complex brain diseases. In addition to addressing a clinical need, bringing together academic scientists with a broad range of techniques and knowledge, this close collaboration will enrich interdisciplinary scientific training to design chemical tools for neuropathology across Europe, and provide lead compounds with the potential for transfer to the European pharmaceutical industry.

Runtime 2011 – 2015, 18 COST countries involved

MC Chair: Dr Rona RAMSAY (UK)

MC Vice-Chair: Prof. Laura DELLA CORTE (IT)

GLISTEN: GPCR-Ligand Interactions, Structures, and Transmembrane Signalling: a European Research Network – CM1207

G protein-coupled receptors (GPCRs) are the largest family of proteins involved in signal transduction across membranes and one of the most important pharmaceutical drug target classes. In the past five years, an unprecedented number of X-ray structures of GPCRs have been solved, affording us first peeks at the molecular details of their function. Based on these and forthcoming structures, this COST Action will bring together experts in a wide range of complementary methods to unravel details of the activation mechanism, ligand binding, and the effect of the membrane and other interaction partners on

GPCRs. The information exchange that will be made possible by the COST Action will lead to innovative insights into mechanistic details of GPCR function. This will in turn give rise to novel effector molecules to be used as lead structures for drug development, offering valuable new opportunities for European pharmaceutical research and industry.

Runtime 2011 – 2015, 18 COST countries involved

MC Chair: Dr Peter KOLB (DE)

MC Vice-Chair: Dr Chris DE GRAAF (NL)

The European upconversion network - from the design of photon-upconverting nanomaterials to biomedical applications – CM1403

Photoluminescent upconverting nanomaterials (UCNMs) are lanthanide-doped nanocrystals that emit visible light under near-infrared excitation. The unique anti-Stokes emission enables background-free luminescent detection, which is essential for many diagnostic applications, bioimaging and chemical sensing. UCNMs are highly photostable and display narrow line-like emissions that enable long observation times and multiplexed detection. Research on photon-upconversion is highly interdisciplinary, but currently fragmented without synchronised research actions in Europe. Further progress in the field is severely restricted by the lack of unified methods for the synthesis, functionalization and characterisation of UCNMs. Missing reference materials and commercial instrumentation make it impossible to compare the results from different groups and precludes the commercialisation of bioanalytical assays, biosensors and diagnostic tools based on these highly promising materials. Consequently, a European network is required to coordinate basic and applied research on UCNMs, standardise procedures, and to make European scientists as well as the high-tech industry aware of this emerging technology. This Action is based on a broad range of scientific disciplines to identify and solve numerous research problems such as upconversion enhancement, surface (bio)functionalisation, detection instrumentation, bioanalytical and diagnostic applications, as well as (nano)toxicity.

Runtime 2014 – 2018, 27 COST countries & 1 Near Neighbour Country involved

MC Chair: Dr Hans-Heiner GORRIS (DE)

MC Vice-Chair: Prof. Tero SOUKKA (FI)

Memristors - Devices, Models, Circuits, Systems and Applications (MemoCiS) – IC1401

The invention of the “transfer resistor”, or “transistor” as it is known today, is considered to be the greatest invention of the 20th century, as it forms the basis of all electronic systems. The next technological revolution will come through self-organizing and self-programming circuits and systems, which are similar to biological brains in that they can learn to perform tasks. The recently rediscovered Memristor offers a computational substrate with plasticity, in which adaptive circuits can be efficiently implemented. This Action is aimed at bringing together researchers of different backgrounds to work in unison so as to overcome multidisciplinary barriers in the area of memristors. Bringing together device designers, device modelers, circuit theorists, analogue and digital designers, neuromorphic engineers and computation scientists will enable the defragmentation of current research efforts and is likely the to bring then next technological revolution. The creation of the hardware basis for future self-

organizing/self-programming systems will really open up a wide range of application areas and new industries, e.g. humanoid robots to look after the elderly, self-driven vehicles etc.

Runtime 2014 – 2018, 25 COST countries involved

MC Chair: Dr Julius GEORGIOU (Cyprus)

MC Vice-Chair: Prof. Fernando CORINTO (IT)

European Network on Robotics for NeuroRehabilitation – TD1006

The aging of the European population will inevitably accelerate the demand for effective rehabilitative therapies to ameliorate the motor deficits caused by major age-associated neurological syndromes such as stroke. Robots for neurorehabilitation offer a significant advantage in addressing this need. They can extend substantially the capacities of therapists who work with patients suffering from motor impairments. Typical robotic devices can convey instructions to patients on how to perform specific movements, can assist and guide the execution of motor actions, and can objectively assess movement capabilities. The growing variety of robotic devices used in primary research and clinical practice offers a rich framework for expanding their use in an expanding number of different patient groups. The main objectives of this Action are firstly to develop new, efficient and patient-tailored robot-assisted therapies by coordinating basic and applied research perspectives. Secondly, the Action will provide a clear structured overview about existing and emerging robot-assisted therapies to clinicians and therapists, so they can increase the availability of effective, standardised clinical practice across Europe. The Action will be carried out by an interdisciplinary team of leading researchers from robot engineering, clinical motor neurorehabilitation, computational neuroscience and motor neuroimaging.

Runtime 2011 – 2015, 23 COST countries involved

MC Chair: Dr Thierry KELLER (ES)

MC Vice-Chair: Prof. Duncan TURNER (UK)

European Network for the Joint Evaluation of Connected Health Technologies (ENJECT) – TD1405

The term 'Connected Health' is increasingly being used to describe this new technology-enabled model of healthcare delivery, and it encompasses terms such as wireless, digital, electronic, mobile, and tele-health, and refers to a conceptual model for health management, wherein devices, services or interventions are designed around the patient's needs, and health related data is shared, in such a way that the patient can receive care in the most proactive and efficient manner possible. The dominant element of Connected Health is the acquisition of health-related data from the patient in the appropriate context and using aggregation and communication infrastructures to analyse and distribute it amongst the relevant stakeholders at appropriate times. Data may comprise objective results from standard biomedical tests, subjective reports of symptoms or feelings, or on-going monitoring of health-related behaviours in the home and community using body-worn or ambient sensor networks. Data are subsequently aggregated, stored, shared and analysed to derive actionable information triggering appropriate interventions in a proactive manner. A key feature of Connected Health is the potential to bring the patient into the management of their own care, through timely provision of relevant, health-related information and feedback.

Runtime 2014 – 2018, 27 COST countries involved

MC Chair: Prof. Brian CAULFIELD (Ireland)

MC Vice-Chair: Dr Myra TILNEY (Malta)

European Network on Individualized Psychotherapy Treatment of Young People with Mental Disorders – CA16102

The main aim of the Action TREATME is to establish a sustainable European multidisciplinary researcher network focusing on individualized psychotherapy for young people with mental disorders.

50% of lifetime mental health disorders start by the age of 14, and the number increases to 75% by the age of 24. Mental disorders in youth are associated with direct and indirect costs including personal distress, costs to family and friends, high healthcare costs, barriers to employment and job performance, poverty and economic deprivation and social exclusion.

The “Roadmap for Mental Health Research in Europe” concludes on the need for coordinated and multidisciplinary efforts to improve knowledge on individualized psychological treatment for young people. Psychotherapy works for the most frequent mental disorders such as anxiety and depression. Different psychotherapy modalities work on average equally well. However, little is known about how different treatment modalities work (the mechanisms of change/mediators) and for whom (specific markers/moderators). Thus, empirically informed individualized treatment cannot be delivered.

The Action reviews the state of the art and identifies putative specific markers and mechanisms of change in different psychotherapy modalities, as well as suitable psychotherapy process and treatment measures, and study designs. Research capacity increases by supporting a high proportion of ECIs and especially female and ITC researchers. Shared knowledge is disseminated to policy makers and stakeholders.

The network promotes collaborative funding applications and meets societal challenges connected to mental health. TREATME paves the way for the matching of mental health research to the needs of young people in Europe.

Runtime 2017 – 2021, 29 COST countries involved

MC Chair: Dr Randi Ulberg (NO)

MC Vice-Chair: Dr Eleni KANELLOPOULOU (EL)

Ion Channels and Immune Response toward a global understanding of immune cell physiology and for new therapeutic approaches (IONCHAN-IMMUNRESPON) – BM1406

The function of ion channels in immune cells is an emerging field of great basic science and clinical interest because they provide powerful molecular targets to modulate immune cell function. The Ionchan-Immunrespon network is a novel and exciting enterprise that involves internationally recognised scientists across 15 European countries. The specific aims are i) to develop a strong European workforce to understand the role of ion channels in immune cells, and how deregulation of their function can cause disease, ii) to identify new targets for therapeutic immuno-interventions through modulation of ion channels. Our unique combination of biophysical approaches combined with molecular biology, cell biology and immunology provides a powerful approach for dissecting the functional cell biology of the immune system.

The Action therefore will strengthen academic research in Immunology within Europe and foster closer collaborations with drug and diagnostics development programs in industry.

Runtime 2015 – 2019, 27 COST countries involved

MC Chair: Dr Florence VELGE-ROUSSEL (FR)

MC Vice-Chair: Dr Pablo PELEGRIN (ES)

Stakeholders in the field of European Brain Research participating in the event

As mentioned above, the European support provided is a web with different initiatives that complement each other. COST aims to bring together representatives of these initiatives together with researchers who represent COST Actions. This section provides information about selected stakeholders which contribute to the discussion.

European Brain Council

EBC European Brain Council	The European Brain Council (EBC) is a non-profit organisation gathering patient associations, major brain-related societies as well as industries. Established in March 2002, its mission is to promote brain research in order to improve the quality of life of those living with brain disorders in Europe. 165 million Europeans are living with a brain disorder, causing a global cost (direct and indirect) exceeding 800 billion euros for the National Health budgets. EBC's main action areas are: • Fostering cooperation with its members organisations • Promoting dialogue between scientists, industry and society • Interacting with the European Commission, the European Parliament and other relevant international institutions • Raising awareness and promoting education on the brain • Disseminating information about brain research and brain diseases in Europe.
Relevant links	http://www.braincouncil.eu/ Latest publications: www.braincouncil.eu/library/ebc-studies-and-reports

Innovative Medicines Initiative

	The goal of IMI, particularly in its second phase (IMI2, 2014-2020) is to develop next generation vaccines, medicines and treatments, such as new antibiotics. Our projects will provide Europeans, including the increasing numbers of older people, with more efficient and effective medicines and treatments. Greater coordination across industry sectors will result in more reliable and faster clinical trials, and better regulation. Our research and innovation efforts will also open new commercial possibilities based on new services and products. The research, industry and societal sectors involved in IMI2 will benefit from the cooperation and knowledge sharing which take place in these projects. In particular, our projects aim to: ▪ improve the current drug development process by providing support for the development of tools, standards and approaches to assess efficacy, safety and quality of regulated health products; ▪ develop diagnostic and treatment biomarkers for diseases clearly linked to clinical relevance and approved by regulators; ▪ where possible, reduce the time to reach clinical proof of concept in medicine development, such as for cancer, immunological, respiratory, neurological and neurodegenerative diseases; ▪ increase the success rate in clinical trials of priority medicines identified by the World Health Organisation; ▪ develop new therapies for diseases for which there is a high unmet need, such as Alzheimer's disease and limited market incentives, such as antimicrobial resistance; ▪ reduce the failure rate of vaccine candidates in phase III clinical trials through new biomarkers for initial efficacy and safety checks.
Relevant links	https://www.imi.europa.eu/ Latest publications: www.imi.europa.eu/projects-results

European Federation of Neurological Associations

	The European Federation of Neurological Associations [EFNA] is an umbrella group representing pan-European neurology patient groups. Our slogan 'Empowering Patient Neurology Groups' encapsulates our goals as an Association. We strive to add capacity to our members – allowing them to be the most effective advocates possible in their own disease specific areas. EFNA embraces the concept of Partnership for Progress – working at a high level with relevant stakeholders from the fields of policy, medical, scientific/research, industry, patient partners and other key opinion leaders. EFNA's aims are to improve the quality of life of people with neurological disorders, their families and carers by working in four strategic areas: Advocacy – Empowerment – Awareness – Engagement
Relevant links	https://www.efna.net/ Latest publications: www.efna.net/news

European Commission

European Commission	EU support for Brain research As brain disorders are one of the greatest challenges the world faces these days, the solutions are likely to be beyond the scope and resources of any single country and must be addressed collectively. Hence the need for considerable efforts in research, not only in terms of funding, but also better coordination of research, among European countries, with other countries around the world, as well as between academia and industry. At the same time there is a need to develop personalised medicine approaches to various forms of many brain disorders. The European Commission has been supporting brain research through the Framework programmes for many years. In the 7th Framework programme (2007-2013), €3.1 billion was invested in 1.931 projects and so far in the Horizon 2020 programme (2014-2020) another € 1.1 billion has been allocated. This is equivalent to just over € 400 million per year for the past 10 years. These investments have been directed at better understanding brain function and dysfunction, developing methods for diagnosis and monitoring, prevention, treatment as well as care & support. The EC is also supporting the Human Brain Project (HBP), a Future and Emerging Technologies Flagship that aims to provide a cutting-edge, ICT-based scientific Research Infrastructure for brain research, cognitive neuroscience and brain-inspired computing. The EC is also fostering cooperation among EU Member States through the EU Joint Programme – Neurodegenerative Disease Research (JPND), which is the largest global research initiative aimed at tackling the challenge of neurodegenerative diseases. JPND involves 30 countries who are striving to align their national priorities and areas of excellence for increased efficiency and impact. The EC is also leading an International initiative for Traumatic Brian Injury Research (InTBIR) with the US and Canada which allows researchers in Europe and North America to work together for better treatment of TBI burden in order to lower its impact on patients, families and healthcare systems.
Relevant links	http://ec.europa.eu/research/health Latest publications: cordis.europa.eu/search…

Human Brain Project

	The Human Brain Project (HBP) is building a research infrastructure to help advance neuroscience, medicine and computing. It is one of the two largest scientific projects ever funded by the European Union. The 10-year Project began in 2013 and directly employs some 500 scientists at more than 100 universities, teaching hospitals and research centres across Europe. Six ICT research Platforms form the heart of the HBP infrastructure: Neuroinformatics (access to shared brain data), Brain Simulation (replication of brain architecture and activity on computers), High Performance Analytics and Computing (providing the required computing and analytics capabilities), Medical Informatics (access to patient data, identification of disease signatures), Neuromorphic Computing (development of brain-inspired computing) and Neurorobotics (use of robots to test brain simulations). The HBP also undertakes targeted research and theoretical studies, and explores brain structure and function in humans, rodents and other species. In addition, the Project studies the ethical and societal implications of HBP's work.
Relevant links	https://www.humanbrainproject.eu/en/ Latest publications: www.humanbrainproject.eu/en/science/hbp-science-publications

European Commission – DG Connect

European Commission	DG CONNECT works to develop a Digital Single Market in order to generate smart, sustainable and inclusive growth in Europe. The European Commission Directorate General for Communications Networks, Content & Technology (DG CONNECT) works with colleagues from across the DSM project team. DG Connect conceives and implements the policies required to create a Digital Single Market for more growth and jobs, where citizens, businesses, and public administrations can seamlessly and fairly access and provide digital goods, content and services. They foster a modern, secure, open, and pluralistic society building on Europe's cultural diversity, creativity and respect of creators' rights and values such as democracy, freedom of expression and tolerance. They help drive the digital transformation of European industry and public services through the use of innovative digital technology and support for the development of digital skills. They strive to develop a long-term vision investing in potential technology breakthroughs and flagships, which can improve peoples' lives and to increase the competitiveness of the European economy at large and its key sectors. They live the values as a creative, responsible and result-oriented European Union public service. They work on the best available evidence, and they cooperate closely with stakeholders, international partners and other EU institutions. They seek value for the taxpayer's money in all they do.
Relevant links	https://ec.europa.eu/info/departments/communications-networks-content-and-technology_en

European Commission - Marie Skłodowska-Curie Actions

	Grants provided by Marie Skłodowska-Curie Actions are available for all stages of a researcher's career. Fellows include PhD candidates and those carrying out more advanced research. Because they encourage individuals to work in other countries, the MSCA make the whole world a learning environment. They encourage collaboration and sharing of ideas between different industrial sectors and research disciplines – all to the benefit of the wider European economy. MSCA also back initiatives that break down barriers between academia, industry and business. In addition, they reach out to the public with events that promote the value – and fun side – of science. These inter-related goals are reflected in the various types of MSCA actions. It all adds up to a huge investment. In fact, the EU has set aside EUR 6.16 billion to be spent by 2020 on researcher training and career development.
Relevant links	https://ec.europa.eu/research/mariecurieactions/msca-actions_en Funding opportunities: ec.europa.eu/research/mariecurieactions/actions/get-funding_en

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Notes

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