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Proposed topic for upcoming call - Health Programme 2018-2020

Specific challenge What is the biggest challenge in the field concerned which requires immediate action under the next Work Programme?

1. To understand the functions of sleep and the public health impact of sleep disorders across Europe.
2. To identify determinants of sleep disturbances including life style factors.
3. To establish new medical and behavioural treatments for sleep disorders

Scope

1. Sleep is a major physiological function and is fundamental for development, learning, memory, health and well-being from infancy to senescence.
2. Sleep deprivation affects 5 to 10% of the European population (Leger, 2011; Bonke, 2015), and is responsible for up to 20% of traffic and industrial accidents (Goncalves 2015; Leger 2014; Sagaspe, 2010). Chronic sleep deprivation is a common feature of modern lifestyle in Europe, affecting all ages.
3. Sleep disturbances impact health, daytime function and can induce pathological sleepiness.
4. Chronic sleep disorders increases the risk of co-morbidities (obesity, type-2 diabetes, hypertension, stroke, myocardial infarction, depression, cancer) and mortality (Schmidt et al 2015; Pan et al 2014).
5. Sleep is a marker of aging. Growing evidence indicates that disordered sleep is involved in cognitive dysfunction. In the elderly, it accelerates neurodegenerative disorders, such as dementia and Parkinson's disease (Kang et al 2009; Xie et al 2013 ; Ju et al 2014).

Despite this evidence and the strong tradition of sleep research in Europe, sleep health is still considered a trivial and non-priority issue by society and health care professionals. To overcome this problem, increased awareness and integrated research on sleep disorders is urgently needed.

Due to the multidisciplinary nature of sleep disorders, multidisciplinary networking is mandatory (Arnadottir et al. 2016). This will enable the complex interactions between sleep, health and chronic conditions to be more deeply explored. As a result, this can improve quality of life and decrease medical costs. Centres of excellence in Europe can collaborate on large and well-powered studies if connected and supported.

Thus, the help of the EU is particularly necessary to expand the field of sleep research and sleep medicine in Europe.

Expected impact

1. A better understanding of the sleep mechanisms and functions will open new opportunities to develop innovative diagnostics and targeted treatment options for sleep diseases.
2. Countermeasures taken at European level could prevent the development of sleep disorders and their consequences.
3. Focussing on populations at risk for acute and chronic sleep deprivation (e.g., shift workers, adolescents) can reduce morbidity, mortality and prevent accidents.

Type of action:

Research and Innovation Action

Is there already a European consortium working on this subject?

The European Sleep Research Society (ESRS, www.esrs.eu) is a scientific non-profit organisation with approximately 1000 full members and 6000 associate members, who come from different research areas such as neuroscience, physiology, pulmonary medicine, neurology, psychiatry, and psychology. ESRS constitutes the main scientific and medical sleep society in Europe. The mission of the ESRS is to promote research and training, and to establish new standards in the field of sleep medicine throughout Europe (Fischer et al., 2012; Penzel et al., 2014). More than 100 laboratories are currently active on sleep-related research topics throughout Europe.

The ESRS is closely connected to the **National Sleep Societies of 31 European countries** in a federal-like structure through the **Assembly of National Sleep Societies (ANSS, <http://www.esrs.eu/committees-networks/assembly-of-national-sleep-societies-anss.html>)**.

The following **Research Consortia/Networks** dealing with specific Sleep Research and Sleep Medicine related topics are presently active in Europe and are primarily connected to the ESRS (<http://www.esrs.eu/committees-networks.html>). None of them are currently specifically funded by EU grants.

- Sleep Apnea Network/European Sleep Apnea Cohort (ESADA) study group
- Sleep and Epilepsy Task Force (in collaboration between the ESRS, the European Chapter of the International League Against Epilepsy (EC_ILAE), and the European Academy of Neurology (EAN))
- European Insomnia network (EIN)
- European Narcolepsy network (EU-NN, www.narcolepsy-network.eu)
- International REM Sleep Behaviour Disorder Study Group
- European Restless Legs Syndrome Study Group (www.eurlssg.org)

The current proposal has been agreed and signed by the Presidents of the following National Sleep Societies, which are members of the ANSS:

- Armenian Sleep Disorders Association (ARSDA)
- Austrian Sleep Research Association (ÖGSM / ASRA)
- Belgian Association for Sleep Research and Sleep Medicine (B.A.S.S)
- British Sleep Society (BSS)
- Bulgarian Society of Sleep Medicine
- Croatian Somnological Society - Society for Sleep Medicine of the Croatian Medical Association
- Czech Sleep Research and Sleep Medicine Society
- Danish Society for Sleep Medicine (DSSM)
- Dutch Society for Sleep-Wake Research
- Estonian Sleep Medicine Association
- Finnish Sleep Research Society (SUS)
- French Sleep Research and Medicine Society (SFRMS)
- German Sleep Society (DGSM)
- Hellenic Sleep Research Society (HSRS)
- Hungarian Sleep Research Society
- Icelandic Sleep Research Society (ISRS)
- Irish Sleep Society (ISS)

- Italian Sleep Medicine Society (AIMS)
- Lithuanian Sleep Medicine Society
- Norwegian Society of Sleep Medicine (NOSM)
- Polish Sleep Research Society (PTBS)
- Portuguese Sleep Association (APS)
- Romanian Sleep Society (SRS)
- Russian Society of Somnologists
- Serbian Somnologic Society
- Slovak Society of Sleep Medicine (SSSM)
- Slovene Sleep Society
- Spanish Sleep Society (SSS)
- Swedish Sleep Society (SFSS)
- Swiss Society for Sleep Research, Sleep Medicine and Chronobiology (SSSSC)
- Turkish Sleep Medicine Society (TSMS)

Questions related to the proposed topic to be addressed:

- 1) What is the biggest challenge in the field concerned which requires immediate action under the next Work Programme? Which related innovation aspects could reach market deployment within 5-7 years?

1. Improve detection and characterization of sleep disorders by implementing standardized diagnostic criteria at a European level.
2. Understanding the basic mechanisms of sleep functions.
3. Development of new targeted treatment strategies:
 - a. technological and pharmacological solutions.
 - b. implementation of educational programs based on internet, connected portable devices and smartphones. This will improve well-being, sleep hygiene and decrease CNS drugs consumption, particularly hypnotics.
 - c. to develop new agents for treatment including neuroprotective approaches (drugs, but also dietary changes and exercise) to reduce the future development of neurodegenerative disease in high-risk population.

- 2) What are the key assumptions underpinning the development of these areas (research & innovation, demand side and consumer behaviour, citizens' and civil society's concerns and expectations)?

1. Sleep is an essential physiological function and sleep disorders severely impact morbidity and mortality in Europe.
2. Societal organizational demands force numerous European citizens to curtail their sleep, but unlike smoking, nutrition or obesity, a very limited amount of education, prevention and treatment resources are dedicated to the field of sleep disorders.
3. Unlike in the US, sleep medicine is not yet recognized as a medical speciality in Europe. As a consequence, most countries have no teaching programs or accredited sleep centers. EU citizens expect a better quality of life and therefore deserve better education on sleep hygiene and improved treatment of sleep disorders.

- 3) What is the output that could be foreseen, what could the impact be, what would success look like, and what are the opportunities for international linkages?

- The impact of the program would be to:
1. improve health and well-being among all EU citizens.
 2. reduce morbidity and mortality, especially stroke, diabetes, obesity, cardiovascular diseases, depression, cognitive decline and cancer.

3. reduce occupational and traffic accidents,
4. slow the development of neurodegenerative diseases.

Educational programs, work organization, pharmacological and technological countermeasures will be shared across Europe. This will become a launching platform for technical and biomedical innovation spreading to other areas of the world.

- 4) Which are the bottlenecks in addressing these areas, and what are the inherent risks and uncertainties, and how could these be addressed?

1. Collaboration on sleep research and medicine among European clinicians and researchers
2. Sleep science and sleep medicine considered as irrelevant fields of interest.
3. Lack of investments to develop new treatments.
4. Lack of validation of Information and Communication Technologies (ICT).
5. Limited political awareness at the European level on the importance of sleep habits, optimal daytime performance and treatment of sleep disorders.
6. Insufficient number of sleep centers and accredited professionals causing long waiting lists and underdiagnosis/misdiagnosis.

- 5) Which gaps (science and technology, markets, policy) and potential game changers, including the role of the public sector in accelerating changes, need to be taken into account?

1. Sleep research (basic and clinic) is growing, but needs to be consolidated and strongly developed by means of establishing European collaborations.
2. Sleep is a multidisciplinary field that will allow neurologic, psychiatric, respiratory, endocrinologic, cardiovascular, pediatric, surgical, anesthesiologic, geriatric experts to interact and collaborate in a common research program.
3. Recommendations for transportation and labour organisations to implement sleep hygiene and safety.
4. Translational collaboration between ICT experts and sleep scientists.

- 6) In which areas is the strongest potential to leverage the EU knowledge base for innovation and, in particular, ensure the participation of industry and SMEs? What is the best balance between bottom-up activities and support to key industrial roadmaps?

1. Transportation safety (private and public transportation).
 2. Pharmaceutical research (new alerting drugs and new hypnotics based on novel neurotransmitter systems).
- Technological industries, car manufacturers, pharmaceutical and medical companies need to strongly interact with academic and clinical centers in EU networks to create innovative approaches, drugs and technologies.**

- 7) Which areas have the most potential to support integrated activities, in particular across the societal challenges and applying key enabling technologies in the societal challenges and vice versa; and cross-cutting activities such as social sciences and humanities, responsible research and innovation including gender aspects, and climate and sustainable development? Which types of interdisciplinary activities will be supported?

1. Education, public awareness, health care and research.
2. Due to its multidisciplinary nature, sleep medicine can become an innovative model for a top-down and bottom-up organization of health in Europe.

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