CONNECT
COGNITIVE DECLINE IN NEPHRO-NEUROLOGY

MAY 2023 | VOL. 3

NEWSLETTER

CA19127 CONNECT
COGNITIVE DECLINE IN NEPHRO-NEUROLOGY: EUROPEAN COOPERATION TARGET

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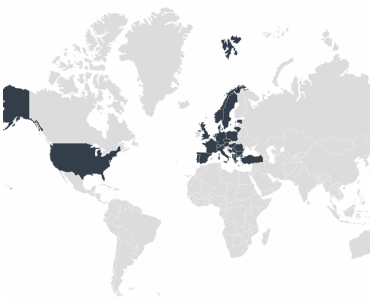
UPCOMING EVENTS

STSM NEWS



TRAINING SCHOOL IN LISBON

TRAINING SCHOOL IN BELGRADE

MC MEETING

cost
EUROPEAN COOPERATION IN SCIENCE & TECHNOLOGY

PUBLICATIONS

The need for a multi-disciplinary reflection about frailty and cognitive impairment in chronic kidney disease. Farisco, M., Zecchino, I., Capasso, G., & CONNECT Consortium (2023). Nephrology, dialysis, transplantation: official publication of the European Dialysis and Transplant Association - European Renal Association, 38(5), 1064–1066. https://doi.org/10.1093/ndt/gfac334

For Cognitive disorders with CONNECT members

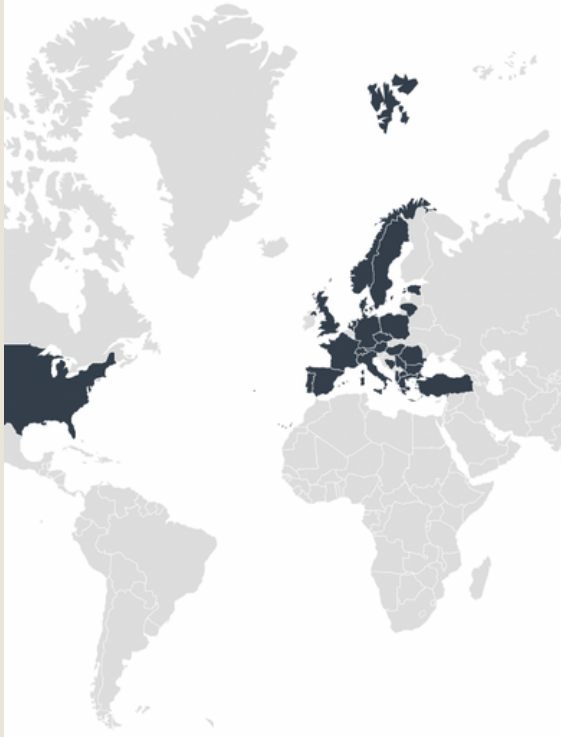
Cognitive performance is associated with glomerular filtration rate in patients with chronic kidney disease: results from the CKD-REIN cohort. Pépin M, Levassort H, Boucquemont J, Lambert O, Alencar de Pinho N, Turinici M, Helmer C, Metzger M, Cheddani L, Frimat L, Combe C, Fouque D, Laville M, Ayav C, Liabeuf S, Jacquelinet C, Teillet L, Stengel B, Massy ZA; CKD-REIN Study Collaborators.J Neurol Neurosurg Psychiatry. 2023 Jan 24:jnnp-2022-330347.

Phosphate in the Context of Cognitive Impairment and Other Neurological Disorders Occurrence in Chronic Kidney Disease.
Rroji M, Figurek A, Viggiano D, Capasso G, Spasovski G.Int J Mol Sci. 2022 Jul 1;23(13):7362. doi: 10.3390/ijms23137362.

How much time does it take to get cognitive impairment in kidney disease?
Viggiano D, Capasso G.Nephrol Dial Transplant. 2022 Jan 25;37(2):203-204. doi: 10.1093/ndt/gfab220.
with CONNECT members

SHORT-TERM SCIENTIFIC MISSION (STSM)

Short Term Scientific Missions (STSM) are institutional visits aimed at supporting individual mobility, fostering collaboration between individuals. Until now, there are 12 STSM participants in the 2nd grant period of the CONNECT COST action.



STSMs form one of the core components of COST Actions and provide a unique opportunity to both achieve the mission of the COST Action and at the same time foster scientific exchange in Europe. Please read the experiences of the STSMs that have been completed so far within CONNECT in this newsletter.

We kindly invite you to keep submitting your applications for STSMs within "CONNECT"!

Prof Ewout Hoorn,
STSM Coordinator

Participant: Abbas Shams, Naples, Italy

Host: Maria José Soler, Barcelona, Spain

Title: Applications of nephrectomy and kidney morphometry in animal models for understanding the kidney-brain crosstalk

At Biogem, I mainly work with rat models for the purpose of assessing the biocompatibility of various peritoneal dialysis solutions with alternative osmotic agents. During my two weeks at Vall d´Hebron Research Institute (VHIR) Barcelona, I had the opportunity to work with murine models to learn techniques such as performing nephrectomy, kidney morphometry, and GFR measurement using the transdermal device. These skills are helpful in developing competence to perform our future experiments on animal models with pathologies such as chronic kidney disease (CKD) and diabetes for understanding the relationship between CKD and cognitive impairment. During my visit, I also attended a seminar by Dr Ander Vergara titled “Role of Apelin in cardiovascular and renal complications of diabetes in renal transplantation”.

Participant: Hong Xu, Sweden

Host: Davide Viggiano, Naples, Italy

Title: Preclinical and clinical methods in brain-kidney interaction research

My one-week STSM at the University of Campania allows me to see in vivo studies in animal models and clinical work/research in human subjects aimed at understanding the biological and pathophysiological mechanisms of the kidney-brain connection and the effects of kidney function on cognitive impairment /dementia in clinical studies.
During my stay at the University of Campania, my tutor Prof. Davide Viggiano brought me to meet many excellent researchers/physicians from different departments at the university. During my visit, I learned about the art of animal models of kidney diseases on cognitive impairment as well as dementia utilizing the state-of-the-art methods of in vivo imaging. This approach can be used to analyse brain regions that are particularly vulnerable in Alzheimer’s disease (i.e., entorhinal cortex, hippocampus), for targets related to neuroinflammation, synaptic function, amyloid-β plaque deposition, and cholesterol, metabolism to further study the mechanism of kidney-brain nexus at the molecular level.At the end of my visit, I understand how animal models can be used to dissect the connection between kidney diseases and brain dysfunction. In addition. I see how this information can be translated into the clinical setting.

Barcelona, Spain

STSM IN EUROPE

Map for STSMs in 2nd period

In the 2nd grant period

- Gaye Hafez from Turkey to Serbia; Experimental models for cognitive impairment and transgenic mice with motor disabilities– a possible model of CKD
- Antonio de Donato from Italy to Portugal; Tools to understand cognitive mechanisms in CKD patients
- Luciano D'Apolito from Italy to Serbia; Behavioral analysis on animal models of peritoneal dialysis and cerebral oedema
- Michele Della Corte from Italy to Poland; Understanding of cognitive impairment in kidney transplant recipient
- Abbas Shams from Italy to Spain; Applications of nephrectomy and kidney morphometry in animal models for understanding the Kidney-Brain crosstalk
- Rashmi Joshi from Italy to Greece; Effect of Muscle alterations on Neurological Complications in Hemodialysis Patients
- Hong Xu from Sweeden to Italy; Application of preclinical and clinical methods in brain-kidney interaction research
- Veronica Buonincontri from Italy to Portugal; Tools to understand cognitive mechanisms in CKD patients
- Mario Zevola from Italy to Switzerland; STSM project for correlating acid-base balance and cognitive health
- Neha Gupta from Italy to Greece: Effect of metabolic alterations on Neurological complications in CKD patients
- Nevison Annang from Italy to Netherlands; The effect of microbiota-derived tryptophan metabolites on the endothelial glycocalyx
- Andrea Melluso from Italy to Czech Republic; Management of CKD in a Czech cohort of patients

Participant: Neha Gupta, Ariano Irpino, Italy

Host: Giorgos K. Sakkas, Thessaly, Greece

Title: Effect of metabolic alterations and muscle dysfunction on Neurological complications in CKD patients

The host lab has extensively worked with chronic kidney disease (CKD) patients suffering from neurological complications. They have observed that exercise could be beneficial for preventing the decline in neural function in kidney disease patients. The two weeks of STSM allowed me to learn new techniques like the critical role of Body composition (BIA, DEXA etc.). This new technique helped to explore new avenues and expand the current understanding of kidney disease. In addition, Prof. Sakkas introduced us to Dr Karatzaferi's classes on muscle mechanics, which covered muscle contraction, exhaustion, dysfunction, and development. Also, the importance of polysomnography training in enhancing lifestyle and lowering neurological problems in CKD/dialysis patients, including exercise, was also discussed. It is well-recognized that metabolic changes can cause chronic renal disease, which can result in muscular dysfunction. It was, therefore, intriguing to learn that physical activity and these novel methods might be crucial in tying metabolic imbalance to muscle atrophy and kidney illness. Understanding innovative processes between neurobiology and nephrology could be aided by addressing these topics using this clinical information and research data. This may lead to the development of new techniques for improved clinical management of kidney-related neurological problems.

Participant: Luciano D'Apolito, Ariano Irpino, Italy

Host: Vesna Pešić, Belgrade, Serbia

Title: Behavioral analysis on animal models of peritoneal dialysis and cerebral edema

Cognitive impairment is common among patients with chronic kidney disease (CKD) and then also in Peritoneal dialysis (PD) patients. Among dialysis patients, the prevalence of cognitive impairment is extremely high. These patients could benefit from cognitive assessment before and periodically after dialysis therapy initiation. The development of new techniques for the study of behaviour in animals has represented the new frontier of experimental research on animal models for years. Many of these methodologies have found considerable success in the area of neurological research, and many of these are in daily use by the research group of Prof. Vesna Pešić at the Faculty of Pharmacy of the University of Belgrade. Activities of STSM were done with the specific aim to develop practical protocols and work plans on how these could be used to study behavioural aspects of cognitive impairment in kidney disease models, including models of peritoneal dialysis. The host site boasts numerous applications and many years of knowledge in the field of the physiology of the brain. Hence the idea of performing behavioural tests to detect the harmful effects of glucose, an osmotic agent used in PD therapy, also on the brain and new insights considering the model of cerebral oedema, a very common status inside the cohort of CKD patients. Although this was a pilot study, the obtained data are very encouraging and will allow further analyses to be carried out to further corroborate the clinical and cognitive status of cerebral oedema. Host's scientific expertise and resources will allow an expansion of knowledge on the physiology of the brain as a starting point for studies on permeability and hemodynamic mechanisms at the cerebral level by exploiting the considerable potential of multiphoton microscopy, a technology used at Biogem Institute.

Participant: Gaye Hafez, Istanbul, Turkey

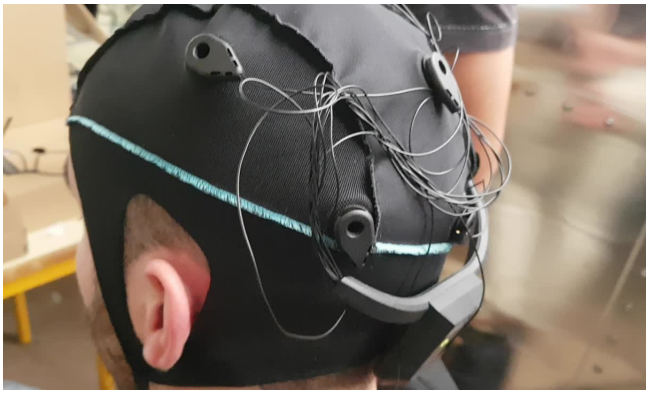
Host: Vesna Pešić, Belgrade, Serbia

Title: Experimental models for cognitive impairment and transgenic mice with motor disabilities– a possible model of CKD

One of the most important goals of CONNECT is to understand the causes of cognitive impairment in chronic kidney disease (CKD) patients. One of the methods is to mimic kidney diseases with animal models and to observe the change in cognitive functions in these animals. During this STSM, to explore the potential of CYP2C19 transgenic mice as a potential model for CKD and mild cognitive impairment, we conducted a pilot study with male and female CYP2C19 transgenic and control mice. It has been demonstrated that CYP2C19 mice have certain motor disabilities such as a "clasp" reflex and characteristic gate which we also observed in our animals. During this STSM period, we performed behavioural studies. such as NORT (novel object recognition test) and SRT (social recognition test) in both wild-type control and transgenic animals. In a nutshell, we conducted this pilot study of animal behaviour to investigate the presence of CKD in CYPC219 transgenic mice and to see how cognitive functions changed. The preliminary results we obtained should be supported by further molecular, histological and microscopic studies.

Most of the publications describing the relationship between CKD-cognitive decline have been attributed to vascular damage. In addition, it is known that uremic toxins, brain-gut axis and neurotrophic factors have a place in the pathology, but further studies are still needed. Developing pharmacological strategies to prevent/improve cognitive impairment is of great importance for these patients, but the gaps in pathology must first be clarified.

Belgrade, Serbia



Participant: Antonio de Donato, Naples, Italy

Host: Alexandre Andrade, Lisboa, Portugal

Title: Tools to understand cognitive mechanisms in CKD patients

During the period I stayed at the hosting institution I had the possibility to learn how to use tools and techniques for monitoring and analyzing brain function. The experiments conducted on volunteers were of considerable importance in understanding both the hardware and software operation of instruments such as the 64-channel EEG and the new 8-channel Unicorn device. In particular, knowledge was acquired on the new data processing strategies of fNIRS like the use of specific tools in Matlab such as Homer3. Analysing brain activity in patients with CKD, during dialysis, is not possible today, as it would require a very complex and uncomfortable procedure. However, fNIRS and EEG could be a valid alternative for studying brain activity both in normal conditions and during dialysis. In particular, the use of these new tools and new analytical techniques will allow our working group to better understand the mechanisms underlying cognitive deficits in patients with chronic renal failure (CKD). This STSM will be useful also to create a multidisciplinary team between the BIOGEM /University of Campania and the IBEB institutes. This new collaboration that combines cognitive, physiological, nephrological and mathematical approaches will improve the skills and collaborative potential of the two institutions.

UPCOMING EVENTS

Photo: Patras, Greece

CONNECT Training School: Animal models to study the relationship between kidney disease and mild cognitive impairment

The training school is organized as part of the activities of working group 1 (animal models of CKD and MCI) by Prof Vesna Pesic (Belgrade) and Prof Carsten A Wagner (Zurich)
Place and time: Belgrade, 28-29 September, 2023 (2 full days)
Participants: 15

The training school will combine lectures by international speakers from CONNECT and outside, hand-on demonstrations, group discussions, and presentations by participants. The main topics that will be covered are: clinical presentations of patients with CKD and MCI, models to study kidney disease and cognitive impairment.

methods to image kidney and brain functions, techniques to study vascular function and to examine “omics” and transcriptomics, the role of blood brain barrier, and relevance of the brain lymphatics and liquor circulation.

A more detailed program and more details will be shared on website and by e-mail. Stay tuned!

Another Training School in Lisbon

Save also this date:
1-2 September 2023
Place: Lisbon, Portugal

Organized by: Prof Alexandre Andrade, Dr Ana Carina Ferreira

The program and the participant acceptance details will be shared on our website and social media accounts.

MANAGEMENT COMMITTEE (MC) MEETING

26-27 MAY 2023,
PATRAS, GREECE

The program details and the venue will be shared on our website and social media accounts.

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