SPEAKER'S BIOGRAPHY

Ragnhildur Thóra Káradóttir

Affiliation: Wellcome Trust – Medical Research Council Stem Cell Institute and Dept. of Veterinary Medicine, University of Cambridge, UK; rk385@cam.ac.uk

Biomedical Centre, Medical Faculty, University of Iceland, Reykjavík, Iceland; ragnhildkara@hi.is

EEDUCATION, DEGREE, CURRENT WORK FIELD, SPECIAL INTERESTS

Ragnhildur Thóra Káradóttir did her undergraduate degree in Biochemistry at the University of Iceland. For her postgraduate training, she entered the Wellcome Trust 4-year PhD Programme in Neuroscience, at UCL, where she undertook her PhD with Prof. David Attwell. Shortly after her PhD she was awarded a Dorothy Hodgkin Fellowship of the Royal Society and started her independent lab at the University of Cambridge in 2008.

Since establishing her lab, she has been awarded a number of awards, most recently the Lister Institute Research Prize (one of 5 in the UK), the Allen Distinguished Investigator Award (one of 5 worldwide) and an ERC consolidator award. In 2015 she was elected to the FENS-Kavli Network of Excellence (one of 20 in Europe), and in 2020 she became the director of the Centre for Myelin Repair, funded by the UK MS society at the University of Cambridge.

Her main research interest is to understand how neuronal activity can regulate oligodendrocyte precursor cells (OPCs) differentiation and myelin plasticity in health and disease.

MAIN CONTRIBUTIONS TO NEUROSCIENCE

Káradóttir has contributed most extensively to our understanding of CNS white matter. During her PhD, with Prof. David Attwell, she discovered the presence of NMDA receptors in oligodendrocyte lineage cells and their involvement in ischaemia related white matter damage (Karadottir *et al., Nature 2005*). After establishing her own laboratory, she showed that activation of NMDA receptors plays an important role in activity dependent myelination and remyelination (Lundgaard *et al., PLoS Biol* 2013; *Recommended by Faculty of 1000 and News highlight in Nature Reviews in Neuroscience*). This delineated for the first-time the existence of activity dependent and independent myelination. During her postdoctoral work, she demonstrated that a subclass of NG2-expressing oligodendrocyte precursor cells (OPCs) in the CNS white matter can fire action potentials and sense their environment by receiving synaptic input, from unmyelinated axons (Karadottir *et al., Nature Neuroscience 2008; rated by Nature as the best non-Nature paper of 2008 in the field of neuroscience*). In her own laboratory, she then showed that OPCs sense neuronal activity differently between regions and age, and that there exist at least 5 functional states of OPCs (Spitzer *et al., Neuron* 2019; *highlighted by News and Views article in Neuron and highlighted in Cell Stem Cell*). She demonstrated that, after a demyelinating injury, synaptic inputs from demyelinated axons direct OPCs to differentiate into myelinating oligodendrocytes to restore function (Gautier *et al., Nature Communications* 2015). Furthermore, she has co-edited special issues on the CNS white matter and myelination, and written a number of invited reviews on the topic, highlighting the important role of the CNS white matter for normal brain function.

LECTURE by Ragnhildur Thóra Káradóttir

Activity-dependent myelination, a mechanism for learning and repair

ABSTRACT

Myelin, produced by oligodendrocytes, is essential for normal brain function, as it provides fast signal transmission, promotes synchronisation of neuronal signals and helps to maintain neuronal function. Alterations in myelination are increasingly being implicated as a mechanism for learning. The importance of myelin becomes evident in diseases, such as multiple sclerosis, where myelin damage causes cognitive and motor disability. Uniquely for the CNS, myelin can regenerate, but this often fails causing sustained clinical deficits. This lecture will focus on the regulation of myelination and explore how the mechanisms of myelin plasticity may underpin myelin regeneration.

SPEAKER'S BIOGRAPHY

Lene Juel Rasmussen

Affiliation: Center for Healthy Aging and Department of Cellular and Molecular Medicine, University of Copenhagen, Denmark; lenera@sund.ku.dk

EDUCATION, DEGREE, CURRENT WORK FIELD, SPECIAL INTERESTS

Professor Lene Juel Rasmussen is Professor of Molecular Aging at Center for Healthy Aging and Department of Cellular and Molecular Medicine, University of Copenhagen. She is Executive Director at Center for Healthy Aging.

Center for Healthy Aging is a research center that studies how more people can have a healthy life and healthy aging. The approach to research is interdisciplinary and the center studies aging and aging processes from cell to society.

Professor Lene Juel Rasmussen's own research focus at understanding the processes of cellular aging, the genetic origins of complex diseases, as well as the impact of environmental factors, which is the central challenge of modern biomedicine. Basic research into cells and genes is important for understanding how we decline throughout life and become more liable to disease. Having the knowledge means we might be able to postpone the point in life at which illnesses associated with old age typically occur, and thus give many people more years of high quality life.

Her research group identifies molecular targets for the treatment of age-related diseases and investigates the powerhouses of the cells – the mitochondria. Research in mitochondria touches several disease-related fields at the clinical level, because mitochondrial dysfunction or mutations contribute to the ontogeny of cancer, diabetes, blindness, deafness, migraine, and diseases of the heart, kidney, liver, and muscles. Furthermore, mitochondrial dysfunction is involved in aging and neurodegenerative disorders such as Parkinson's and Alzheimer's dementia.

Professor Lene Juel Rasmussen received in 2016 The Olav Thon Research Grant Award, became in 2019 elected member of The Norwegian Academy of Science and Letters, and has from 2014-2016 been Chair of the Steering Committee for International Alliance of Research Universities.

EDUCATION
1991: PhD. in Molecular Genetics, Department of Microbiology, Technical University of Denmark, Copenhagen, Denmark
1988: MSc. in Chemical Engineering, Technical University of Denmark, Copenhagen, Denmark

POSITIONS
2009-: Executive Director, Center for Healthy Aging, University of Copenhagen, Copenhagen, Denmark
2009-: Professor, University of Copenhagen, Copenhagen, Denmark
2008 winter: Visiting Scientist, National Institute of Aging (NIA), Baltimore, USA
2007 fall: Visiting Scientist, National Institute of Environmental Health (NIEHS/NIH), Raleigh/Durham, USA
2006-2009: Professor, Roskilde University, Roskilde, Denmark
2000-2005: Associate Professor, Roskilde University, Roskilde, Denmark
1997 summer: Visiting Scientist, Johns Hopkins University, Baltimore, USA
1996-1999: Assistant Professor, Roskilde University, Roskilde, Denmark
1994-1996: Postdoctoral Research, Harvard University, Harvard School of Public Health, Boston, USA

1991-1994: Postdoctoral Research, University of Massachusetts Medical School, Worcester, USA
1988-1991: Graduate Research, Technical University of Denmark, Copenhagen, Denmark

SELECTED PROFESSIONAL ACTIVITIES
2019-present: Elected member of The Norwegian Academy of Science and Letters
(http://english.dnva.no/c41974/seksjon/vis.html?tid=41993)
2015-present: Editorial Board member of the journal Mitochondrion
2014-2016: Chair of the Steering Committee for International Alliance of Research Universities (IARU)
2013-present: Member of the international Insight expert panel evaluating MMR VUS
2012-present: Board member of The Danish Society for Molecular Medicine (DK)
2008-present: Member of workgroup under World Health Organization (WHO) to define guideline for diagnosis of breast and colon cancers
2004-present: Member of the Danish Academy of Natural Sciences

LECTURE by Lene Juel Rasmussen

Healthy Brain Aging: understand and intervene

ABSTRACT

Aging is characterized by a progressive loss of physiological integrity, leading to impaired function and increased vulnerability to disease and death. This deterioration is the primary risk factor for major human pathologies, including cancer, diabetes, cardiovascular disorders, and neurodegenerative diseases. Every day, our bodies experience cycles of tissue breakdown, damage, or trauma followed by subsequent regeneration, recovery, or repair to re-establish homeostasis. Any damage requires adequate repair to maintain optimal body function. The response to damage is physiological. It occurs daily, with cross-talk between the brain and other tissues, and involving stem cells, sophisticated molecular regulators, and the circadian clock. Therefore, it is important to understand the link between increased damage with age, overloading of the existing repair mechanisms, their exhaustion, and medical disability and disease. This will increase our understanding of the modifiable pathways of damage and repair in aging and explore the possibilities of positively influencing these.