Scientists propose a molecular explanation for degenerative disease

August 16 2013

An international collaboration jointly led by scientists from Trinity College Dublin has shed new light on the origins and molecular causes of age related degenerative conditions including Motor Neurone Disease (MND). The new perspective provided by this work may lead the way to new treatments and early diagnoses.

The article which has just been published in the leading peer reviewed, international journal *Cell*, offers new opportunities for early diagnosis of age related degenerative diseases before symptoms appear, including through the identification of disease causing genes. It also suggests specific strategies for developing therapies which might have both preventative and therapeutic benefits for this class of degenerative disease.

Commenting on the significance of the findings co-lead author Professor Mani Ramaswami, Professor of Neurogenetics at the School of Genetics and Microbiology, Trinity College Dublin said: "Degenerative diseases, such as MND, are a poorly understood and largely untreatable set of life limiting diseases which can leave people unable to do the everyday things that the rest of us, particularly the young, take for granted. These age-associated diseases have far-reaching socioeconomic impacts. If you can predict the disease you may be in a position to slow down its onset and progression through therapeutic interventions. With these types of diseases this is significantly more effective than trying to treat the condition once symptoms have appeared. The potential for early diagnosis and delaying the onset of motor or cognitive decline by

perhaps ten years is of potentially profound importance in an ageing society."

There are nearly 120,000 cases of MND diagnosed worldwide each year with about 300 people in Ireland living with the disease at any one time.

The research just published proposes that the normal biology of mRNA regulation in neurones, in which RNA is generally silenced and only activated in the correct place and time, makes it susceptible to both age-related decline and disturbance by genetic mutation. Altered RNA regulation (ribostasis), therefore, may be a frequent causative factor in degenerative disease. While normal RNA regulation involves regulated and reversible assembly of RNA-protein particles, both increased cellular age and mutation push the process towards hyperassembly, which leads to altered pools of RNA or RNA regulatory proteins in neurones that contribute to their eventual death.

Co-authors of the publication, Professors Ramaswami, Taylor (St. Jude Children's Research Hospital, Memphis) and Parker (University of Colorado) have based their model on a synthesis of findings from their collaborations and recent work by their individual research groups.

The article is titled "Altered 'Ribostasis': RNA-protein granule formation or persistence in the development of degenerative disorders."

More information: www.cell.com/abstract/S0092-8674(13)00946-X

Provided by Trinity College Dublin

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