PsychoAAD-2013

OMICS Group Conferences
Accelerating Scientific Discovery

International Conference on
Psychology, Autism and Alzheimer's Disease

September 30 - October 1, 2013 San Antonio, Texas, USA

The potential role of red blood cells in amyloid toxicity and Alzheimer's disease

Joseph M. Rifkind

National Institute on Aging, USA

Abstract

Red Blood Cells (RBC) in the cerebral circulation are in intimate contact with the vascular system. We have shown that amyloid fibrils are readily transferred between the vasculature and the circulating RBCs. Although RBCs take up amyloids, the measured levels of RBC amyloids are very low. This is attributed to the transfer of amyloids back to the vasculature and the relatively rapid removal from circulation of RBCs that retain amyloid. The transfer of amyloid from RBCs back to the vasculature contributes to the spread of cerebral amyloid angiopathy found in Alzheimer's disease (AD). The oxidative stress triggered while the amyloid is still associated with RBCs, which is dramatically enhanced in the presence of metal ions like Cu (II), is thought to be responsible for the impaired RBC morphology observed in subjects with AD. These RBC modifications found even after the amyloids are removed resulting in impaired deformability and adherence of RBCs to the endothelium, both of which contribute to cerebral hypo perfusion. The increased oxidative stress and vascular adhesion is also expected to result in the transfer or reactive oxygen species to the vasculature which can trigger an inflammatory response. These studies suggest that although RBCs do not accumulate a significant fraction of the amyloid generated during AD, the transient effects of the interaction of RBCs with amyloids can contribute to cerebral amyloid angiopathy, cerebral hypo perfusion and inflammation that trigger neuronal dysfunction and AD.

Biography

Joseph M. Rifkind completed his Ph.D. in Physical Chemistry from Columbia University in 1966. He has been at the National Institutes of Health since 1968. Since 1985, he was the Chief of the Molecular Dynamics Section at the National Institute on Aging. He has published over 130 papers in peer reviewed journals and over 20 book chapters. His research has been directed at the physiological role of oxidative stress and nitric oxide metabolism primarily involving the red blood cell with 8 papers dealing with amyloids and Alzheimer's disease.

RifkindJ@grc.nia.nih.gov