



## Vincent S Gallicchio

Clemson University, USA

### Lithium and stem cells - Advances in stem cell application in clinical medicine

Lithium (Li) salts have been widely used in psychiatry as mood stabilizing agents for 60 years. Li is found in variable amounts in foods, especially grains, vegetables and in some areas, the drinking water. Collectively these sources provide a significant source of the element. Therefore, dietary intake in humans depends on location, type of foods consumed and fluid intake. Traces of Li have been detected in human organs and tissues, leading speculation that the element was responsible for specific functions in the human body. It was not until the 20th century that studies performed in the 1970's and 1990's, primarily in chickens, cows, rats and goats, maintained on Li-deficient diets demonstrated higher mortality, altered reproductive and behavioral abnormalities. Such deficiencies have not been detected in humans; however, studies performed on populations living in areas with low Li levels in water supplies have been associated with higher rates of suicides, homicides and the arrests rate for drug abuse and other violence-based crimes. Li appears to play a significant role in early fetal development as evidenced by high Li levels during the early gestational period. Biochemically, the mechanism of Li action is multifactorial involving interconnection pathways incorporating enzymes (a potent inhibitor of GSK3 $\beta$ ), hormones, vitamins and growth and transforming factors. It clearly can substitute for magnesium as a cation catalyst and at the molecular level it is an effective inhibitor of the Wnt signal transduction pathway. This body of evidence now appears sufficient to label Li as an essential element with the recommended RDA for a 70-kg adult of 1000  $\mu\text{g}/\text{day}$ . Of extreme importance for the future is the growing body of evidence indicating Li can

be used effectively for the treatment of acute brain injuries, e.g., ischemia and chronic neurodegenerative diseases such as Alzheimer's disease, Parkinson's disease, Tauopathies and Huntington's disease. This conclusion is based upon increasing evidence showing Li as important in neurogenesis as well as protecting neurons from neurotoxicity. More than thirty years ago, it was discovered Li influences stem cells derived from bone marrow by increasing their proliferation, thus stem cell numbers are increased in the presence of Li. It is now being well established that Li increases neurogenesis through stimulation of neuronal derived stem cells. This observation has now shown great promise for additional therapeutic implications for this element in clinical medicine in addition to treating psychiatric/mood disorders. Li has now been shown to be an efficacious treatment modality associated with faulty production or damaged blood or nerve cells, in addition to serving as an effective tool to enhance blood stem cell mobilization for transplantation.

#### Speaker Biography

Vincent S Gallicchio earned his PhD in Experimental Hematology at New York University Medical Center and completed fellowships in Hematology at the Sloan Kettering Institute for Cancer Research and at the University of Connecticut Health Center. He was awarded a diploma in Internal Medicine from the "Vasile Goldis" University of Arad (Romania). He was rated the number one academic biomedical laboratory science researcher in the United States. His rating of 551 was nearly twice that of the next closest professor's score of 285. Additionally, during his leadership, the academic program in Clinical Laboratory Science at the University of Kentucky Medical Center was rated the number one program of its kind among 127 in the nation. His passion for research, a high value placed on excellence, a strong reputation as an esteemed collaborator and a tenacious desire to see a better therapies for human diseases brought to market speak to his overall character.

e: [vsgall@clemson.edu](mailto:vsgall@clemson.edu)