Veronica Parasco et al., J Comput Sci Syst Biol 2014, 7:5
http://dx.doi.org/10.4172/0974-7230.S1.009

OMICS Group Conferences
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2nd International Summit on
Integrative Biology
August 04-05, 2014 Hilton-Chicago/Northbrook, Chicago, USA

The role of scaffold proteins in information transfer in cellular signaling

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Mammalian cells contain about 1 trillion of protein molecules with approximately 10% of which are involved in signal transduction. Given the enormous number of molecules, it is surprising that cells can accurately process the large amount of information they receive constantly. Even so, different signals are often transmitted by common components yet elicit distinct (and appropriate) outcomes. How specificity from signal to cellular response is maintained between different signal transduction pathways that share similar (or identical) components? In the recent decades the notion that cells organize subgroups of proteins in space and time has appeared. In this direction and about 15 years ago, the first scaffold proteins were discovered.

Different isolated components from the signaling network have been extensively studied and characterized in order to then predict the behavior of the integrated system from the behavior of its parts. This notion is based on the hypothesis that the properties of the individual components are not altered as these are interconnected, which is known as "modular organization". However, our work and that of others has shown theoretically and experimentally that bio-molecular systems cannot always be connected modularly: the dynamics of the interconnection can dramatically change the behavior of connected modules, an effect that has been called retroactivity.

We have characterized the interaction between scaffold proteins and retroactivity through a combination of analytical and computational tools using cascades of covalent modification cycles.

Biography

Veronica Parasco has completed his PhD at the age of 28 years from Buenos Aires University, Argentina, and postdoctoral studies from Michigan University, USA. She is now a researcher at Buenos Aires University. She has published almost 30 papers in high impact factor journals in the area of systems biology, mathematical modeling and physical and computational biology.

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