

Contribution ID: 351

Type: **Oral Presentation**

## **Crosstalk in transition: Akt translocation as a damped harmonic oscillator**

*Monday, 9 July 2018 10:30 (20 minutes)*

Akt/PKB (Protein Kinase B) is a major crosstalk node in the mammalian cell. Located at the juncture of several key signalling pathways, it is involved in many cellular processes, such as glucose metabolism, cell growth and the suppression of apoptosis. Dysregulated Akt signalling is implicated in a range of human disorders, from diabetes to cancer.

Initially, Akt is synthesised in the unactivated state on the endoplasmic reticulum. However, the activation (phosphorylation) of Akt in response to insulin stimulation only occurs at the plasma membrane, necessitating the translocation of Akt from the interior to the periphery of the cell. At the moment, the understanding of this translocation process is still in its infancy, but there are some indications that it is a staged process.

We have developed a deterministic, three-compartment, ordinary differential equation (ODE) model of Akt translocation. Given a conservation relation implicit in the model, it can be shown that this system is equivalent to the damped harmonic oscillator equation; a classic, well-studied ODE. With this framework, we investigate the different modes of downstream signalling that can be produced by the model and the conditions for their manifestation.

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**Session Classification:** Biochemistry, signalling & mathematical techniques

**Track Classification:** Biochemistry and Cell Biology