

SONOMECHANOBIOLOGY: A NEW FIELD OF HIGH FREQUENCY CELL MECHANOSTIMULATION

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Time: 10:30 am - 11:45 am



Venue: HKIAS Lecture Theatre,
LG/F, Academic Exchange Building, City University of Hong Kong

Registration

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Abstract: It is well known that cells respond in many different ways to various forms of mechanical cues. To date, however, most mechanostimulation has been carried out at low frequencies, typically several Hz, characteristic of the frequencies associated with the motion experienced by cells in their local environment, for example, in the human body (e.g., walking and running). Where higher frequency vibrational mechanotransduction pathways have been investigated, these have primarily been limited to kHz order, and it has generally been suggested that there is no significant advantage in utilising higher frequencies. In a similar manner to observations of new and often nonlinear discoveries when we couple high frequency (10-30 MHz) vibration in the form of surface and hybrid acoustic waves into fluids as well as crystalline materials, we observe unique and novel phenomena when similar MHz-order vibrational stimuli are transmitted into cells. These include modulation of various ion and piezo channels, and transient, yet reversible, permeabilisation of the cell membrane, which have implications for efficient intracellular cytosol delivery, exosome biogenesis, stem cell differentiation, cytoskeletal reorganisation and endothelial barrier modulation, at the same time maintaining very high levels (>95%) in cellular viability.



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