Darwesh M K Aladin et al., J Cell Sci Ther 2015, 6:2
http://dx.doi.org/10.4172/2157-7013.S1.033

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5th World Congress on
Cell & Stem Cell Research

March 23-25, 2015 DoubleTree by Hilton Chicago - North Shore, USA

siRNA mediated knock down of AQP1 weakens E-cadherin based intercellular adhesion

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Adherens Junctions (AJs) are molecular ensembles that occur at cell–cell junctions in epithelial and endothelial tissues. Cadherinscluster during AJ formationand recruit a multitude ofadditional structural and regulatoryproteins. The intracellular tail of cadherin binds to catenincomplexes that couples cadherins with the actin cytoskeleton.Over 170 proteins have been reported to colocalize in the AJs.Our SILAC immunoprecipitation experiment aimed atidentifying more proteins interacting with E-cadherin identifiedAQP1 as an interacting partner.AQP1 is a member of membranewater channel proteins called the Aquaporins.Silencing of AQP1is known to dramatically affect the actin cytoskeleton organization through Lin-7/β-catenin interaction.Sinceactin dynamics is known to regulate E-cadherin recruitment at AJs in a mechanosensitive manner, we hypothesized thatknocking down AQP1will inhibit theadhesion strength of AJs.Using dual pipette separation force assay, we measured the force required to separate cell doublets that are formed in 18 hrs of culture and compared between the SiRNA mediated AQP1 knockdown S180 cells expressing E-cadherin and the negative SiRNA control cells. As hypothesized, the separation force ofAQP1 knockdown cells was significantly lower than that of the controls. Furthermore, a micropipette aspiration assay of single cells revealed that the cortical shearmodulus of the AQP1 knockdown cells was significantly lower than the control cells. These findings suggest that AQP1 plays a role in the adhesive strength of AJs possibly by controlling thedynamics of actin cytoskeleton.

Biography

Darwesh MK Aladinreceived his PhDin 2010 from the University of Hong Kong.His PhD work was on the multi scale structure and mechanics of intervertebral discs. He is currently pursuing his postdoctoral studies at the Mechanobiology Institute, Singapore, in which he is studying intercellular adhesion and the role of cadherin extracellular domains in particular. He has published 6 papers in reputed journals.He has presented in more than 30 conferences and has won 18 awards including an honorable mention award from the ASME Bioengineering Division.

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