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Unraveling the role of TBCCD1 protein on cell size control: the regulation of cytoskeleton dynamics and cell junctions

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During their lifetime most cells maintain their size. There is increasing evidence showing that this process may be dynamic and that cells can adapt their size in response to external signals and changes in the environment [1], which strongly suggests that cell size is regulated. Both Hippo and IGF/PI3K/AKT/mTORC1 pathways have been described as being involved in cell size/growth control [1]. Interestingly, these pathways are in a cross-talk with others involved and/or dependent on cellular polarity [2]. Our group characterized a centrosomal protein, TBCCD1 (TBCC domain – containing human protein 1) which, when depleted in human retinal epithelial (RPE–1) cells, leads to an abnormal localization of the centrosome at the cell periphery accompanied by the fragmentation of the Golgi apparatus, resulting in the disruption of the intrinsic cell polarity axis “Nucleus-Centrosome-Golgi Apparatus”. Moreover, TBCCD1 – depleted cells are larger, slower and have a lower efficiency in primary cilia assembly than control cells [3]. We identified the TBCCD1 interactome that showed that most of its partners are involved in cell polarity. Furthermore, most of them participate in the formation/maintenance of cell junctions, which are main regulators of cell polarity in epithelia and are upstream of pathways, like Hippo pathway. We also observed that TBCCD1 overexpression affects tubulin acetylation, which supports our results showing that some of

the partners are involved in the regulation of the cytoskeleton dynamics, which may affect cell size. Therefore, it is tempting to hypothesize that the mechanisms involved in the establishment of intrinsic cell polarity may also directly/indirectly participate in the regulation of cell size.

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References

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