Jacinto et al. Cilia 2015, 4(Suppl 1):P84
http://www.ciliajournal.com/content/4/S1/P84

Cilia

POSTER PRESENTATION Open Access

Pkd2 affects the architecture of zebrafish left-right organizer

R Jacinto, P Sampaio, M Roxo-Rosa, S Lopes*

From Cilia 2014 - Second International Conference
Paris, France. 18-21 November 2014

Background

Dorsal anterior clustering (DAC) of motile cilia in the left-right organizer (LRO) is crucial for normal fluid flow dynamics and correct laterality in zebrafish [1]. We directly demonstrated that *charon/dand5* transcription is negatively regulated by strong flow in zebrafish LRO [1] which suggests that LRO cells have the ability to sense fluid flow and influence gene expression patterns, but how? Pkd2 ion channel is a good candidate because it participates in a mechanosensory complex that senses fluid flow and induces a calcium inward flux in kidney cells [2] and in nodal cells [3]. In agreement, mouse and zebrafish mutants for Pkd2 have LR defects [4,5]. However, Pkd2 is also involved in cell polarity during migration [6] and in extracellular matrix deposition [7] implying a role for Pkd2 in cell morphogenesis.

Objective

Determine whether Pkd2 knockdown affects DAC of ciliated LRO cells.

Methods

dnah7 morpholino [1] was injected to generate static cilia without affecting DAC [1]. Each embryo was screened for static cilia by high-speed videomicroscopy. In parallel, Pkd2 knockdowns were imaged for flow dynamics followed by quantification of anterior / posterior cilia number through two-photon microscopy.

Results

Pkd2 knockdown, contrary to Dnah7 knockdown, caused a remodelling in the LRO architecture by disrupting DAC. Moreover, Pkd2 knockdown resulted in abnormal fluid flow as a consequence of defective DAC.

Conclusions

Comparing Dnah7 and Pkd2 knockdowns we concluded that Pkd2 mediated pathway affects LRO morphogenesis by a mechanism that seems to be independent of its role in fluid flow mechanosensation. Meaning that Pkd2 triggers additional responses from those caused by LRO flow.

Supported by FCT-ANR/BEX-BID/0153/2012 grant.

Published: 13 July 2015

References

1. Sampaio P, Ferreira RR, Guerrero A, Pintado P, Tavares B, Amaro J, *et al*: **Left-Right Organizer Flow Dynamics: How Much Cilia Activity Reliably Yields Laterality?** *Developmental Cell* 2014, **29(6)**:716-728.
2. Nauli SM, Alenghat FJ, Luo W, Williams E, Vassilev P, Li X, *et al*: **Polycystins 1 and 2 mediate mechanosensation in the primary cilium of kidney cells.** *Nat Genet* 2003, **33(2)**:129-137.
3. McGrath J, Somlo S, Makova S, Tian X, Brueckner M: **Two Populations of Node Monocilia Initiate Left-Right Asymmetry in the Mouse.** *Cell* 2003, **114(1)**:61-73.
4. Pennekamp P, Karcher C, Fischer A, Schweickert A, Skryabin B, Horst J, *et al*: **The Ion Channel Polycystin-2 Is Required for Left-Right Axis Determination in Mice.** *Current Biology* 2002, **12(11)**:938-943.
5. Schottenfeld J, Sullivan-Brown J, Burdine RD: **Zebrafish curly up encodes a Pkd2 ortholog that restricts left-side-specific expression of southpaw.** *Development* 2007, **134(8)**:1605-1615.
6. Outeda P, Huso DL, Fisher SA, Halushka MK, Kim H, Qian F, *et al*: **Polycystin Signaling Is Required for Directed Endothelial Cell Migration and Lymphatic Development.** *Cell Reports* 2014, **7(3)**:634-644.
7. Mangos S, Lam P, Zhao A, Liu Y, Mudumana S, Vasilyev A, *et al*: **The ADPKD genes pkd1a/b and pkd2 regulate extracellular matrix formation.** *Disease Models & Mechanisms* 2010, **3(5-6)**:354-365.

doi:10.1186/2046-2530-4-S1-P84
Cite this article as: Jacinto *et al.*: Pkd2 affects the architecture of zebrafish left-right organizer. *Cilia* 2015 **4**(Suppl 1):P84.

CEDOC, NOVA Medical School, Lisbon, Portugal