Mapping calcium dynamics in the moving heart of zebrafish embryos with a ratiometric genetically-encoded calcium indicator

J. Salgado-Almaro1, M. Vicente1, P. Vincent2, O. Griesbeck3, B. Domingo1, J. Llopis1
1Centro Regional de Investigaciones Biomédicas, Universidad de Castilla-La Mancha, Albacete, Spain. salgep.salgadouclm.es
2CNRS, "Biological Adaptation and Ageing", Sorbonne Université, Paris, France.
3Max Planck Institute of Neurobiology, Martinsried, Germany.

SUMMARY

Alterations in cytoplasmic Ca\(^{2+}\) levels in heart lead to arrhythmias and heart failure. Zebrafish has become a popular vertebrate in vivo model in cardiovascular research because heart rate and action potential morphology are similar to those of humans.

OBJECTIVES

To generate and evaluate a zebrafish transgenic line to study Ca\(^{2+}\) dynamics in the heart, in models of cardiac disease, and for drug screening.

RESULTS

Tg(cmlc2:Twitch-4) responses to drugs with known effects in human heart

\[ \text{6-adrenergic blocker propranolol (100 µM – 1hr)} \]

\[ \text{L-type Ca\(^{2+}\) channel blocker nifedipine (100 µM – 1hr)} \]

The myosin inhibitor para-amino blebbistatin (PAB) alters fluorescence and increases the ratio

Acknowledgements

Mingyi Science, Innovation and Universities, Spain (IFU2015-E077-R and P1219-115423B-100, co-funded by FEDER-ERDF: Consejería de Educación, Cultura y Deportes, Junta de Comunidades de Castilla-La Mancha (IFU2015-E077-R and P1219-115423B-100, co-funded by EU FEDER/ERDF) and grants for research groups from Universidad de Castilla-La Mancha (2019-GARRI-2019 and 2020-GARRI-2019, co-funded by EU FEDER/ERDF). J.L. holds a postdoctoral fellowship from University of Castilla-La Mancha.

References