Application of in-silico and in-vitro optogenetic tools to cardiac arrhythmia research

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List of Publications

Full text publications

[*] *Equal contributions*

Teplenin AS, De Coster T, Kudryashova NN, Majumder R, de Vries AA, Panfilov AV, Pijnappels DA. Unconventional Collective Resonance as Nonlinear Mechanism of Ectopic Activity in Excitable Media. *In Submission*

De Coster T[*], **Teplenin AS**[*], Feola I, Bart CI, Ramkisoensing AA, den Ouden BL, Ypey DL,Trines SA, Panfilov AV, Zeppenfeld K, de Vries AAF, Pijnappels DA. "Trapped Reentry" as Source of Acute Focal Atrial Arrhythmias. Cardiovascular Research. 2023: cvad179

Ördög B, **Teplenin AS**, De Coster T, Bart CI, Dekker SO, Zhang J, Ypey DL, de Vries AA, Pijnappels DA. The effects of repetitive use and pathological remodeling on channelrhodopsin function in cardiomyocytes. Frontiers in Physiology.2021;12:710020.

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Majumder R, Feola I, **Teplenin AS**, de Vries AA, Panfilov AV, Pijnappels DA. Optogenetics enables real-time spatiotemporal control over spiral wave dynamics in an excitable cardiac system. Elife. 2018;7:e41076.

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Kudryashova NN, **Teplenin AS**, Orlova YV, Selina LV, Agladze K. Arrhythmogenic role of the border between two areas of cardiac cell alignment. Journal of Molecular and Cellular Cardiology. 2014;76:227-34

Presented abstracts(Selection)

Teplenin AS, de Vries AA, Panfilov AV, Pijnappels DA. Ectopic waves from optogenetically controlled zone of depolarization elicited by resonant frequency of cardiac rhythm: Interplay between instability and bistability. Oral Presentation at *Symposium "50 Years of Excitable Media: From Theory to Applications" 2019*

Teplenin AS, de Vries AA, Panfilov AV, Pijnappels DA. Ectopic activity from optogenetically depolarized zone evoked by resonant activity of cardiac rhythm. Oral Presentation at *EHRA EUROPACE-CARDIOSTIM 2019*

Teplenin AS, De Vries AA, Pijnappels DA, Panfilov AV. Ectopic activity from optogeneticallyspaped oxidative stress pattern contradicts conventional sinksource mismatch theory. Oral Presentation at *EHRA EUROPACE-CARDIOSTIM 2017*

Teplenin AS, De Vries AA, Pijnappels DA, Panfilov AV. Ectopic activity from optogenetically defined oxidative stress zone challenges traditional sink-source mismatch paradigm. Oral Presentation at *HRS Conference 2017*

Teplenin AS, De Vries AA, Pijnappels DA, Panfilov AV. Ectopic activity from localized oxidative stress zone violates traditional sink-source mismatch paradigm. Poster Presentation Best Poster Award at *Rembrandt Symposium 2016*.

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Curriculum Vitae

Alexander Teplenin was born on 24th November, 1991 in Chistopol, Republic of Tatarstan, Russian Federation. After completing his secondary education at Chistopol school №16 in 2008 he moved to Moscow region to study at Moscow insitute of Physics and Tecnology (MIPT). During his studies, in 2011, he joined newly opened MegaGrant program laboratory of excitable systems under the lead of prof. Konstatin Agladze. In the laboratory Alexander began to investigate the synergy of tissue engineering and excitable systems. Combining fundamental education and research tasks he obtained both Bachelor's and Master's degree in Applied Mathematics and Physics from MIPT in 2012 and in 2014. To expand his research directions he moved to the Netherlands and joined the laboratory of experimental cardiology at Leiden University University Medical Centre in 2014. There, he began his PhD training under the supervision of prof. D.A. Pijnappels, prof. A.V. Panfilov and A.A.F. de Vries. During his PhD studies, he explored the fundamental mechanisms of cardiac arrhythmias and general behaviour of excitable systems by combining *in-vitro* cardiac experiments, *in-silico* computations and theoretical approaches. The results achieved during his PhD period are presented in this thesis.

Awards and Scholarships

2016 Poster Presentation Award. Rembrandt Conference of Cardiovascular Science.

2013 Lift to the Future Scholarship.

2009 Abramov Fellowship Program for highly performing junior students.