Cardiac dynamics and arrhythmic risk in aged and failing hearts: insights from experimental and computational research

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1. Introduction

Cardiovascular diseases (CVDs) are responsible for more than 4 million deaths per year in Europe. The single major risk factor for CVD is age, which leads to a progressive decline in the physiological functions of the body, with very notable effects on the heart. These effects are associated with enhanced predisposition to cardiac arrhythmias. Also, CVDs like heart failure, with high prevalence in the elderly population, are linked to increased risk for arrhythmia development, in some cases leading to sudden cardiac death.

2. Materials and Methods

In this presentation, integrative approaches combining in silico modeling with in vitro cell and tissue analysis and in vivo electrocardiographic evaluation will be presented [1] [2] [3] [4] [5] [6] [7] [8].

3. Results

Application of such approaches to investigate how aging and cardiovascular diseases manifest at a range of scales, covering from ion channels in the cell membrane to whole-body surface potentials, will be shown. The role of electrical, structural and autonomic alterations in contributing to such manifestations will be explored [1] [8] [9] [10]. Advances towards the proposal of non-invasive markers able to identify aged and diseased individuals at high arrhythmic risk will be presented [10] [11] [12] [13] [14].

4. Discussion and Conclusions

The presented investigations will underscore the role of multidisciplinary research in contributing to improve our current understanding of cardiac electrical dynamics in aged and failing hearts and its role in arrhythmogenesis.

5. References

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