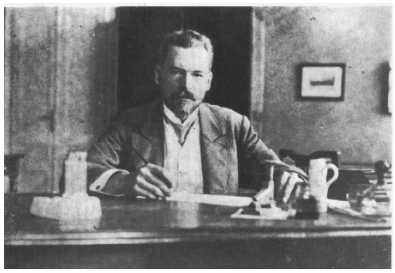

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How fast is the ECG signal and why do we need a kinetic theory of conductance

Wednesday, 29 September 2021 17:30 (20 minutes)

Human body conducts electricity. It is obvious, but many important details are not. It is argued why the most popular theory of conductance in living tissue is not precise and requires a lot more of physics. The foundations of molecular theory of biopotentials are sketched out and the role of various molecular mechanisms of conductance and polarization is explained. It is shown, that there are many riddles in modern electrodiagnostics which cannot be satisfactorily described with use of present theories. It begins from such basic questions as e.g. the morphology of the T wave, the impact of perfusion on the ECG amplitude, role of ionic strength in signal transmission or the reasons for QRS changes observed after dialysis. There is a growing number of phenomena, which forms an evidence, that a new theory of tissue conductance is required. Solution to many of these riddles may be found in the shape of electric impedance spectra and this is closely related to dielectric spectrum of materials, which for complex materials poses a complex problem. Finally the need for a kinetic theory of polarization in electrolytes is expressed; maybe Smoluchowski-Poisson-Boltzmann can solve the problems?
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