Faculté de pharmacie

Université de Montréal

Séminaire des axes « Pharmacométrie et pharmacothérapie » & « Découverte et validation de cibles thérapeutiques »

« Predicting the Risk of Sudden Cardiac Death »

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Pavillon Claire McNicoll
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À l'invitation de la professeure Fahima Nekka

Despite major advances in the prevention and treatment of cardiac disease by drugs and with medical devices, it is still difficult to predict who will experience sudden cardiac death. Common clinical approaches to risk stratification assess a variety of characteristics of the electrocardiogram that can be measured in ambulatory patients or under specialized testing protocols. However, these characteristics do not shed much insight into the mechanisms of the transitions to cardiac rhythms that do not sustain life. I approach the problem of risk stratification for sudden cardiac death from a perspective of basic science. I focus on arrhythmias in which there are frequent abnormal ventricular beats and/or reentrant rhythms in which the heart frequency is not set by the normal pacemaker of the heart but by a circulating wave. I will describe biological and mathematical models for these types cardiac arrhythmias. One current experimental approach is to use optical imaging to study the dynamics of cardiac cells in tissue culture which is grown in different shapes, and which is subjected to different types of stimulation and drug application to initiate and terminate abnormal rhythms. The theoretical analysis uses a variety of mathematical methods including techniques from number theory and nonlinear dynamics. When we apply these techniques to clinical data, we can understand with relative certainty the mechanisms of some cardiac arrhythmias observed in patients based on electrocardiographic data. However, determination of mechanisms of arrhythmias in many patients is still not possible. I believe that better understanding of these arrhythmias is a challenge that will require collaboration of both clinicians and basic scientists.