BOOK REVIEW

ELECTROPHYSIOLOGICAL FOUNDATIONS OF CARDIAC ARRHYTHMIAS

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I very much enjoyed reading this excellent text written in collaborative effort with a noted basic electrophysiologist (Dr. Wit) as well as two esteemed clinicians and research scientists (Dr. Josephson and Dr. Wellens). They are a superb team of scientists as well as experienced teachers. The book is advertised as a bridge to better understand basic arrhythmia mechanisms and it certainly lives up to its objectives. Especially helpful are the simple and clear diagrams that are frequently used as a teaching tool. The book starts out giving the reader an in-depth exploration of arrhythmia mechanisms in terms of normal and abnormal automaticity, afterdepolarization-induced arrhythmias, as well as reentry. In subsequent chapters, these mechanisms are linked to specific arrhythmias with emphases on use differentiating features to better elucidate arrhythmia mechanisms. We are treated initially to a beautiful description of both the anatomy of the sinus node as well as the salient features of the atrial anatomy and this is correlated with variations in ion channel function and distribution that explain both normal automaticity as well as potential sites for abnormal automaticity. The reader is taught to distinguish the two on the bases of response to atrial overdrive pacing (suppression in normal automaticity) and possible overdrive acceleration for abnormal automaticity. The authors also explain how activation of the autonomic nervous system as well as cardiac drugs give insights into mechanisms.

I thought the section on reentry was especially well done explaining factors that lead to inhomogeneity of conduction and refactoriness. They clearly explain concepts of functional changes in ion channel as related to impedance mismatch, anisotropic conduction, as well as gap junction abnormalities. Difficult concepts like ‘leading circle reentry’ and the physiology of rotor formation are clearly explained by simple diagrams. There are strong emphases on the role of electrical stimulation to understand mechanisms of arrhythmias. This is well illustrated in use of premature impulses to assess presence of a fully versus a partially excitable gap. They emphasize the concepts of resetting as well as entrainment in the clinical diagnoses of reentry. The feature of an inverse relationship between the first programmable premature complex with the next tachycardia beat as seen in reentrant circuits sharply differ from that observed for those with delayed afterdepolarization (DAD)-driven arrhythmias.

The text also has excellent sections on basic ion channel physiology as well the effects of genetic mutations in channel function that generate serious rhythm disorders. For example, they nicely link the geneses of torsades de pointes with the early afterdepolarizations observed in the Long QT syndromes. In contrast, DAD-driven arrhythmias are associated with catecholaminergic polymorphous ventricular tachycardia or digitalis-induced arrhythmias. They correctly point out that much of the information for some mechanisms come from cellular studies and emphasize the still existent wide gaps in our clinical knowledge especially related to early and delayed afterdepolarization-driven arrhythmias.

The clinically oriented chapters begin with a series of electrocardiogram (ECG) tracings which are reviewed at the end of the section. This is a nice technique to reinforce complex mechanisms with actual ECG recordings. In addition, another nice teaching tool is a summary statement reviewing the important teaching points for each section. The concise overview is a strong teaching tool serving to reinforce learning.

I was asked to supply constructive comments for the authors. Several points from my personal perspective may be of value. It took me 1 month to complete the text (I have a day job) and while for me it was a labor of love, I can see this as an impediment to the busy clinician. I would recommend not reading the text in one bolus but rather a chapter or two when the appropriate clinical case arises. It might be well to consider the next revision to be markedly condensed since a great deal of the material is iterative of the same mechanisms as applied to different arrhythmias. One other point is that many of the ECG tracings were too small to allow for proper viewing of all features (i.e., P wave morphology). These same ECGs are accompanied by a host of questions (all about the same). I suggest the authors omit the questions and enlarge the ECG panels. In addition, I would rather have the ECG test at the end of the section as it was quite a nuisance to turn back and forth to match answers to questions. I found it unusual to frequently refer readers back to Dr. Josephson’s prior book (which is excellent and appropriate) but fails to recognize the original contributors (i.e., section on entrainment).

These comments are offered in a collegial fashion in an effort to help. The authors are to be congratulated in providing the electrophysiology community with a masterful and much-needed text that really helps to explain difficult concepts and is well integrated into clinical medicine. I found it to be a great resource for review and learned a great deal from reading the book. This text will clearly be enshrined into the pantheon of indispensable books for physicians interested in both learning and teaching arrhythmias.

It is with heartfelt regret that I point out that one of the authors (Dr. Josephson) died shortly before publication of the book. May this book and his other magnificent works live as a living testimony to his contributions as a brilliant scientist and teacher.

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