

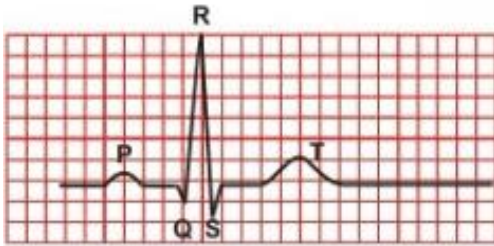


# Clinical Pharmacology & Toxicology Pearl of the Week

## ~ ECG findings in sodium channel blockade toxicity ~

- Some examples of cardiac sodium channel blockers include: tricyclic antidepressants (TCAs), 1<sup>st</sup> generation antihistamines (diphenhydramine), antimalarials (quinidine, chloroquine, hydroxychloroquine), class 1a and 1c antiarrhythmics (procainamide, flecainide), lamotrigine, carbamazepine, topiramate, antipsychotics (chlorpromazine), propranolol and cocaine.
- Sodium channel blocker poisonings may result in several characteristic ECG changes. The presence of these findings may predict the development of serious toxicity (e.g. seizures, arrhythmias after a TCA ingestion).
- Since patients may normally have a QRS between 80-120 ms or an RBBB, it is important to compare with an old ECG and also to look for other features of sodium channel blockade.
- The following figures show the ECG appearance of findings of sodium channel blockade:

### 1. Wide QRS complex (> 100 ms)

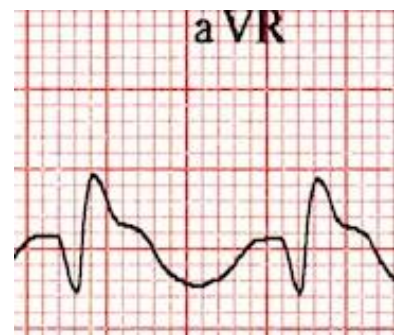
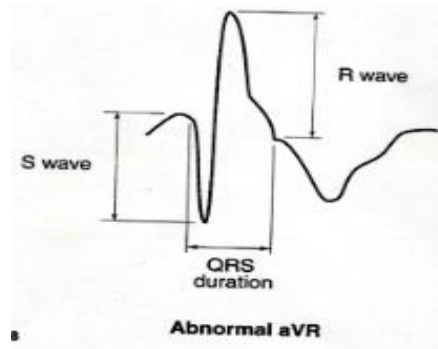
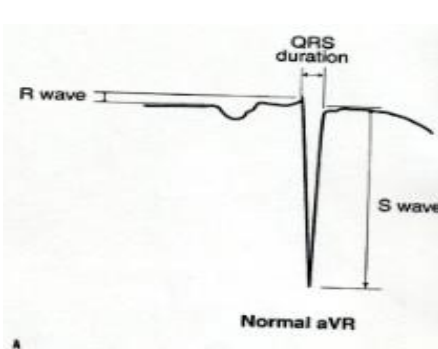


Normal (note: one box = 40 ms)

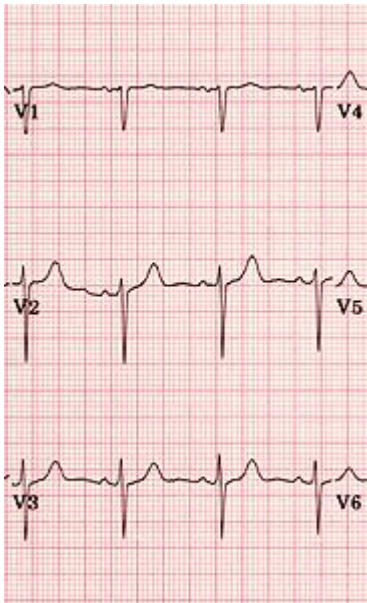


Abnormal

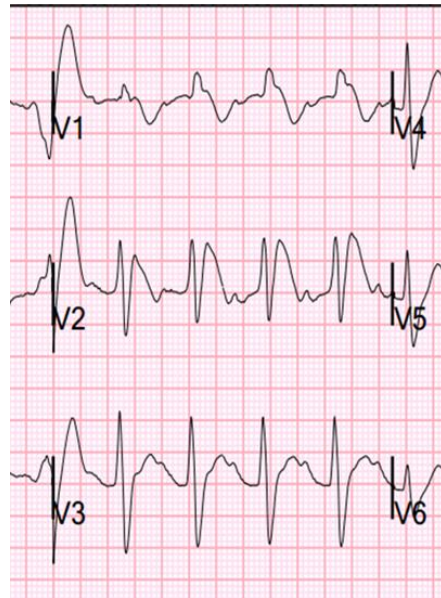
### 2. R wave in lead avR > 3mm (1 mm = 1 box), or b. R wave height ÷ S wave height > 0.7 in lead avR (note: these are the findings seen with the "terminal 40ms deviation" in lead avR)



### 3. Right bundle branch block (aka "Rabbit Ears") or Type 1 Brugada pattern in leads V1-V3

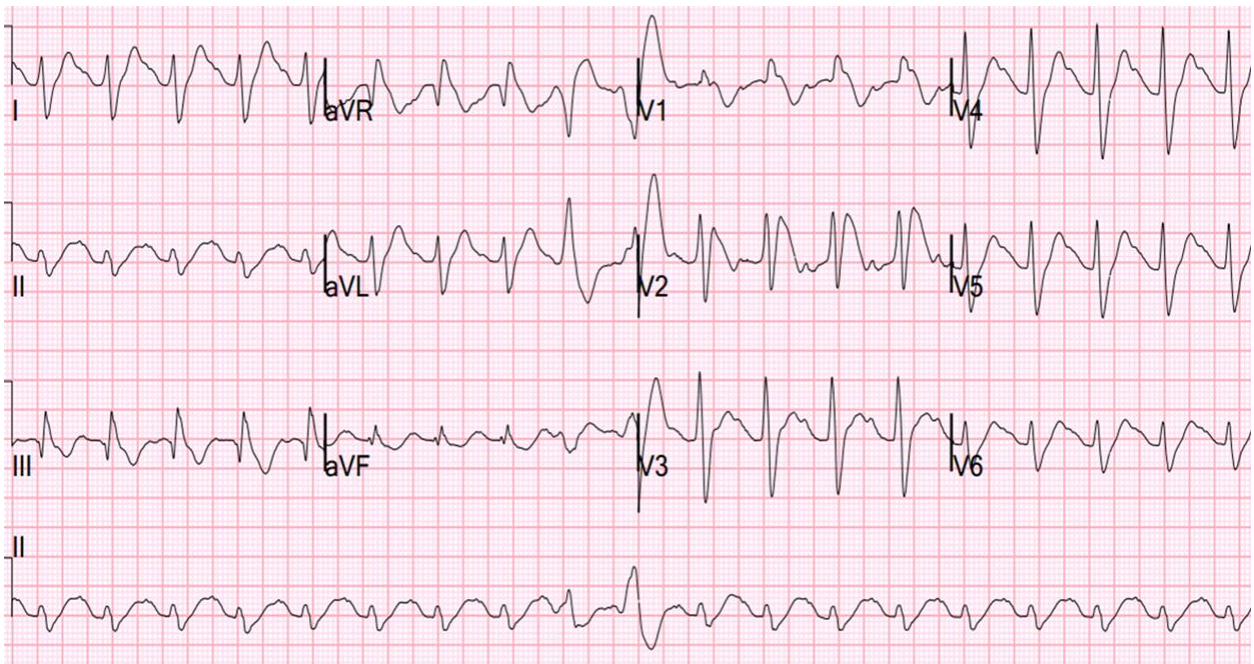


Normal



Abnormal

When combined together, a patient with serious cardiac sodium channel blocker poisoning will have an ECG like this:



The Calgary Clinical Pharmacology physician consultation service is available Mon-Fri, 9am-5pm. The on-call physician is listed in ROCA. Click [HERE](#) for clinical issues the CP service can assist with.



The Poison and Drug Information Service ([PADIS](#)) is available 24/7 for questions related to poisonings. Please call 1-800-332-1414, and select option 1.