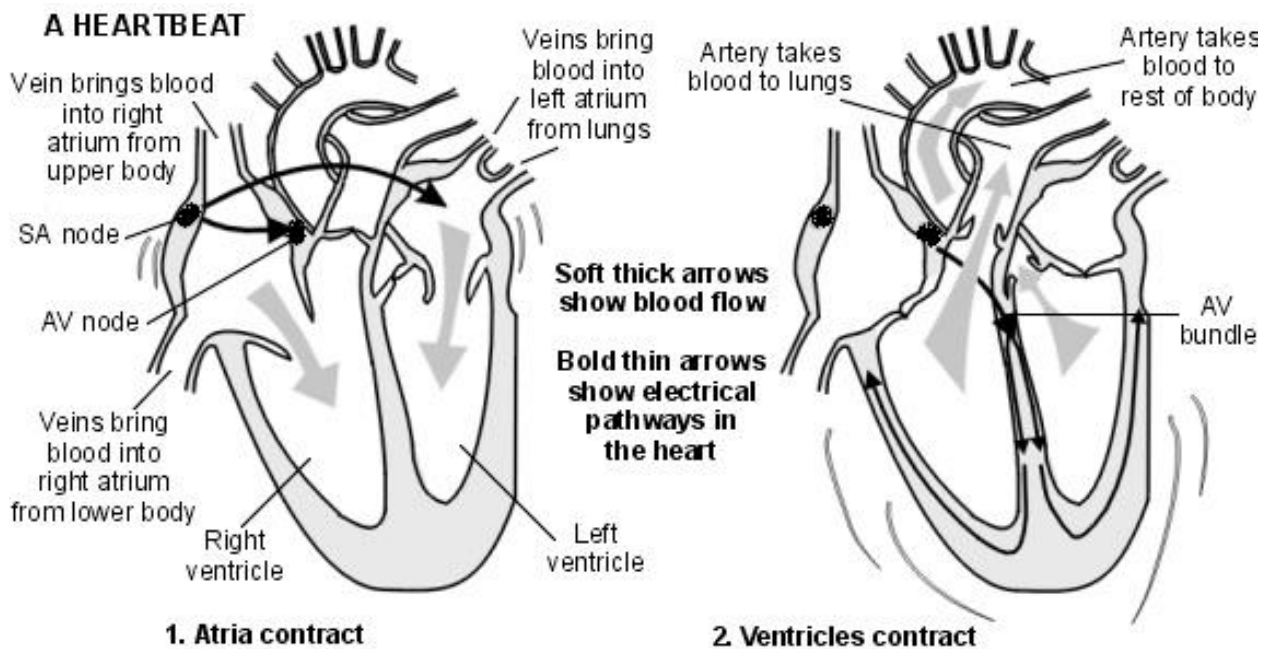


Math 155. Reading 3. Preview to Section 1.11: The Heart.

The beating of the heart is regulated by electrical signals. In Section 1.11, we develop a DTDS that helps us to understand healthy heart as well as hearts with irregular beats.

Section 42.2 “Coordinated Cycles of Heart Contraction” of the Life 102/103 text *Biology*¹ gives more biological background. From the text: “In vertebrates, the heartbeat originates in the heart itself. Some cardiac muscle cells are autorhythmic, meaning that they contract and retract repeatedly, without any signal from the nervous system. You can even see these rhythmic contractions in tissue that has been removed from the heart and placed in a dish in the laboratory! ...how are [these] contractions coordinated in the intact heart? The answer lies in a group of autorhythmic cells...called the **sinoatrial (SA) node**.”



- (1) The *SA node* is an impulse-generating tissue that fires off electric impulses at regular intervals to the *AV node*.
- (2) The *AV node* is like a battery whose charge *changes* in two ways
 - by natural decay (*decrease* in voltage)
 - by accepting a signal from the *SA node* (*increase* in voltage)
- (3) The heart beats whenever the *AV node* accepts a signal from the *SA node*.

In Section 1.11, we develop a DTDS for a beating heart and use it to gain some understanding into how a heart may beat irregularly.

¹N. A. Campbell, J. B. Reece, *et. al. Biology*, Pearson, 2008.