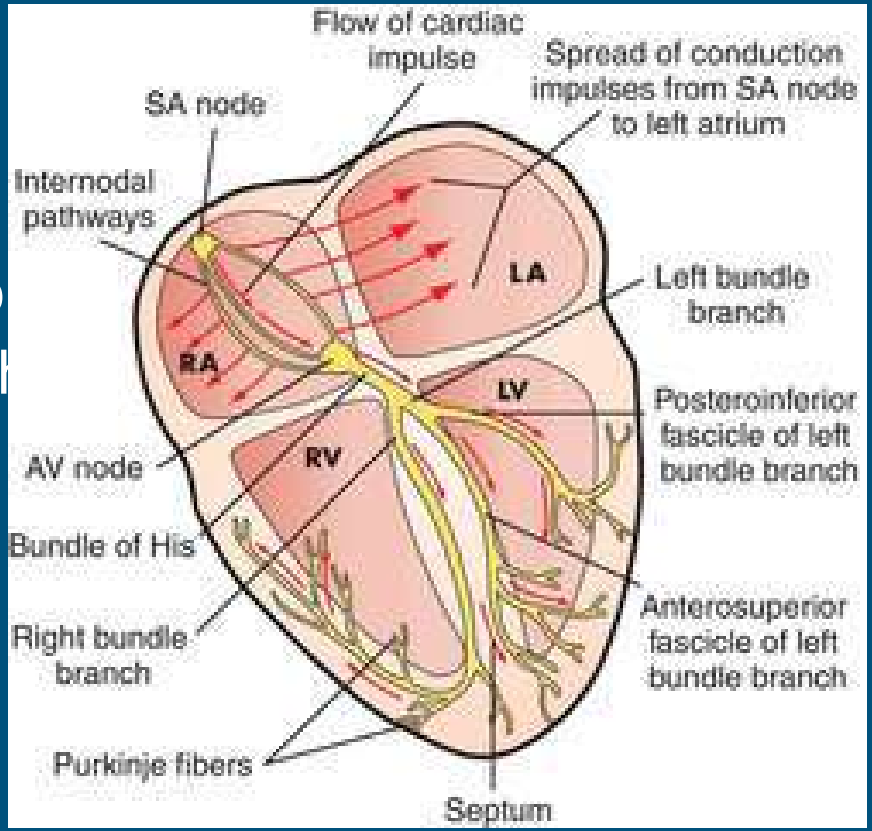
Conduction System

Warm-up: Review blood flow

Parts of heart conduction

- SA (sinoatrial) node
- AV (atrioventricular) node
- Bundle of His (atrioventicular b
  - Left and right bundle branch
- Purkinje fibers



Helpful videos

conduction 1

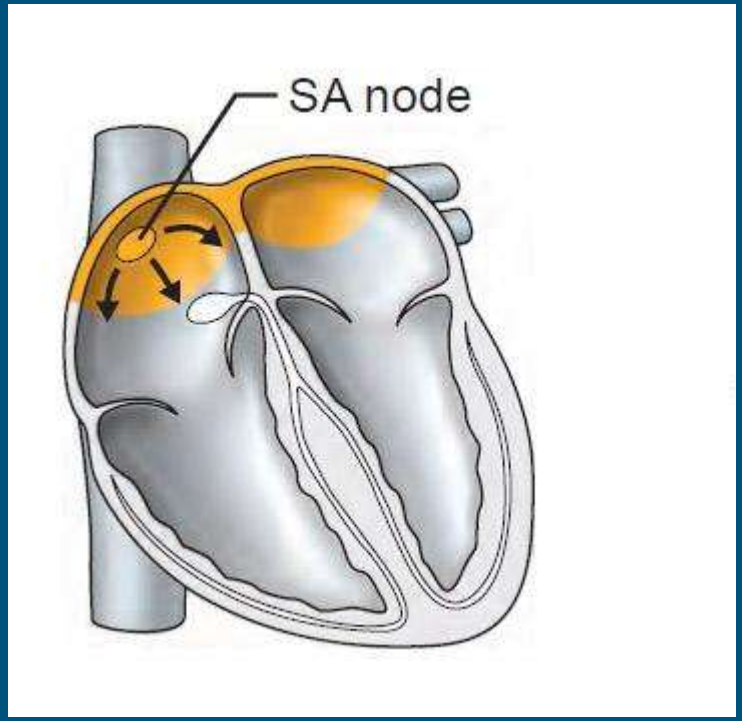
conduction 2

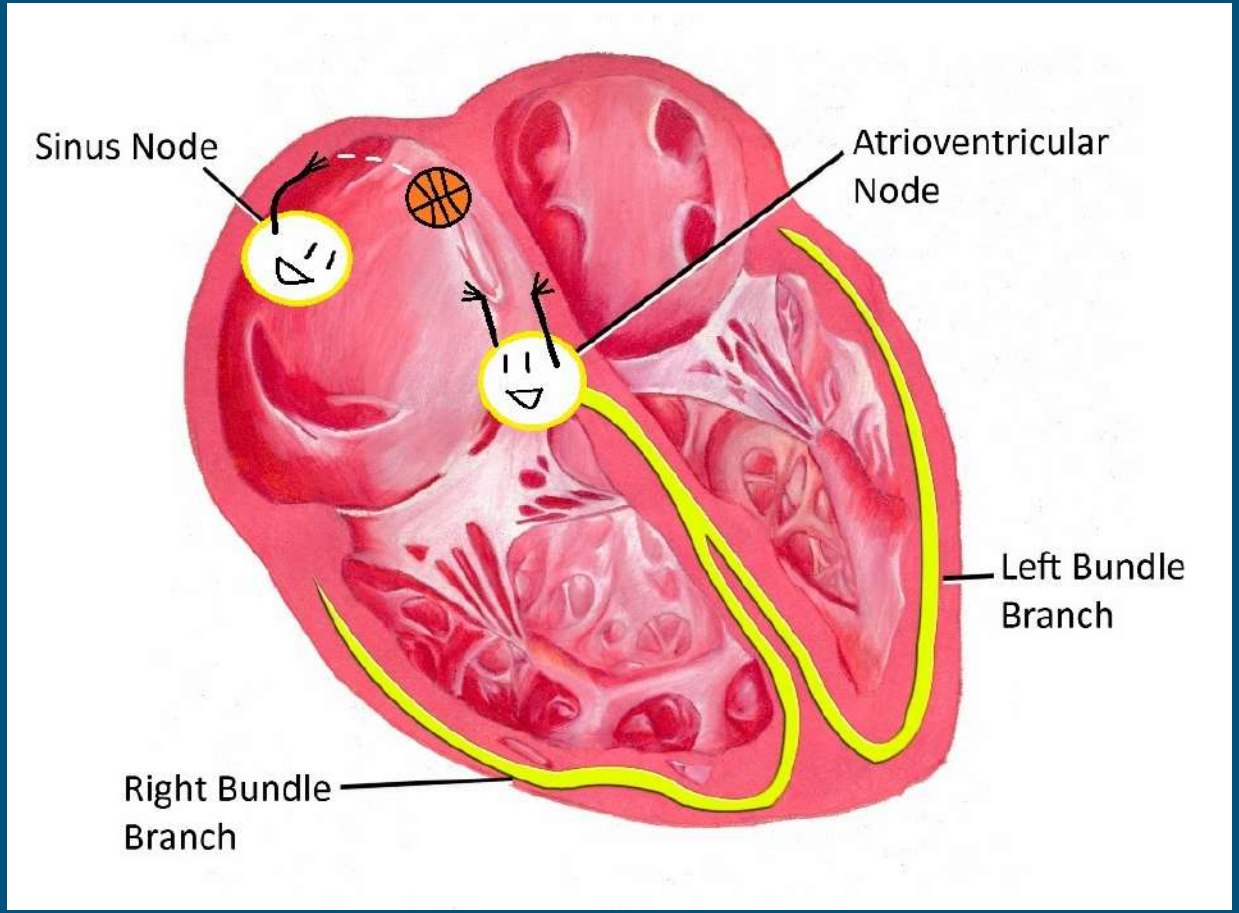
best conduction video

Sinoatrial node (SA)

- Found in the right atrium
- Known as the primary pacemaker
- Fires 60-100x/minute
- Pathway to the left atrium

  via “Bachman’s bundle



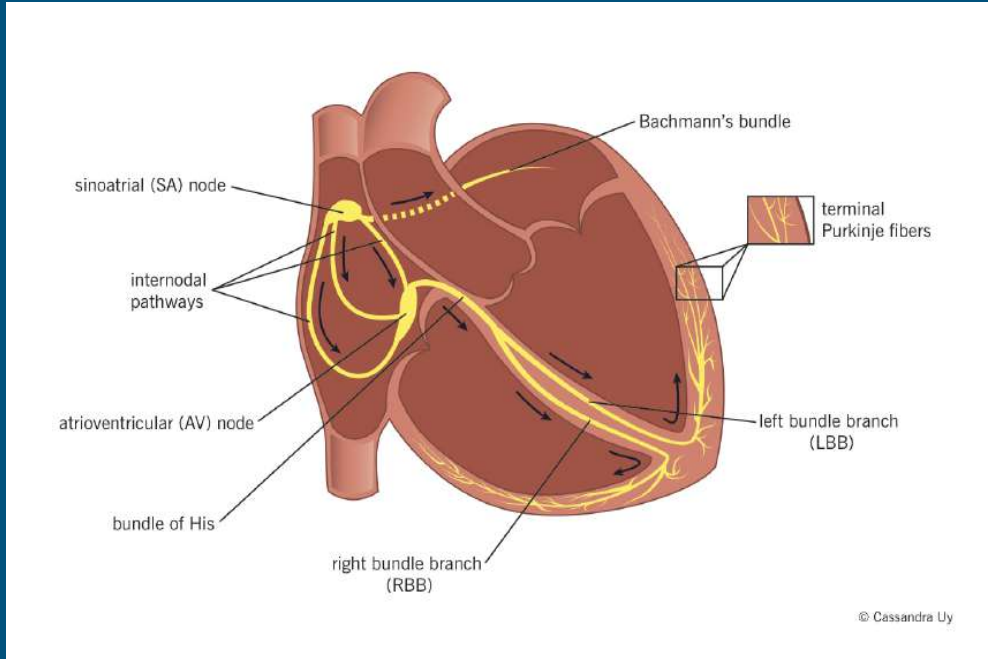

Sinus Node
Atrioventricular Node
Left Bundle Branch
Right Bundle Branch

Atrioventricular node (AV)

- Only part that connects the atria to the ventricles
- The AV node connects to the bundle of His via the AV junction
  - The junction is the backup pacemaker if the SA node fails
- It “holds” the signal until the ventricles have completely filled with blood
- If the SA node fails, it will fire 40-60 time/min

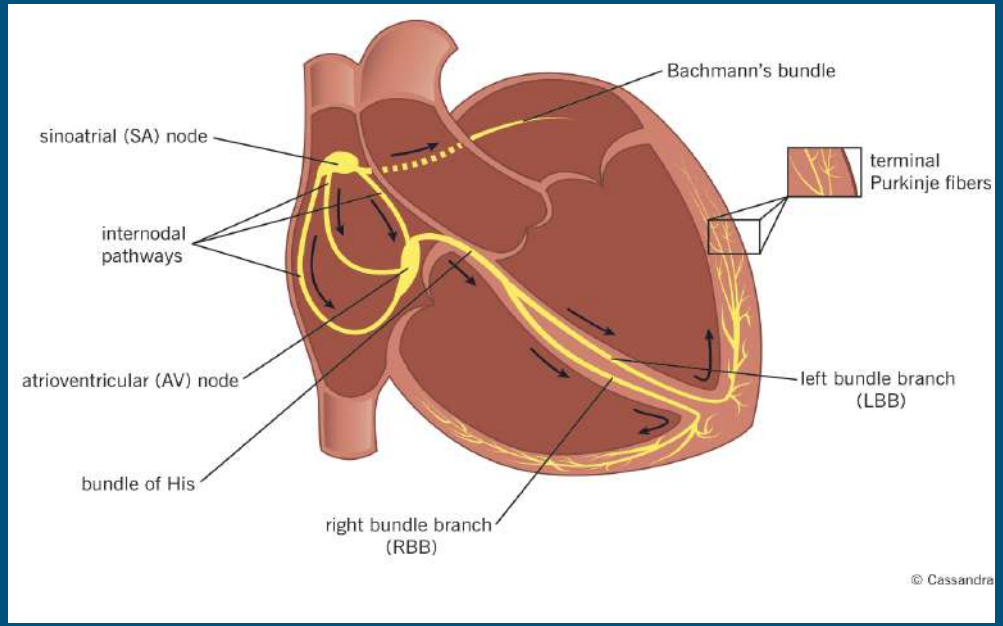
Bundle of His

- Also called interventricular bundle (on the septum)
- It transmits to the right and left bundle branches



Right bundle branch (RBB)

- Carries the electrical impulse from the AV node to Purkinje fibers of the RIGHT ventricle
- Supplied blood from the LAD

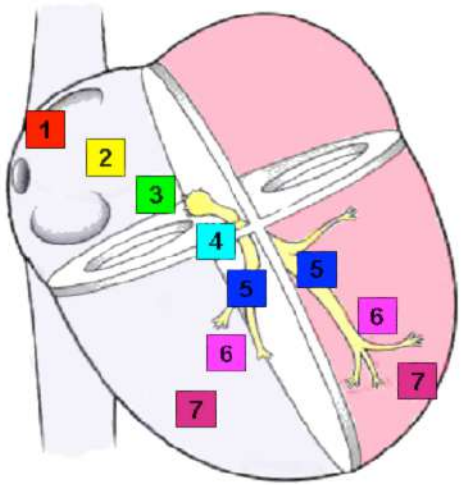


Left bundle branch (LBB)

- Also in the interventricular septum
- Carries from AV node to the Purkinje fibers of left ventricle
- Both bundle branches receive OXYGENATED blood from the LAD
- Left post fascicle receives additional blood supply from the RCA
    - Results in more resistant to ischemia

Purkinje Fibers

- Network of conduction pathways
- Traverse the surface of the ventricles and depolarizes them
- In absence of SA and AV nodes, the purkinje fibers will fire at a rate of 20-40 times/min



Normal Activation Sequence	Structure	Conduction velocity (m/sec)	Pacemaker rate (beats/min)
1	SA node	< 0.01	60 – 100
2	Atrial myocardium	1.0 – 1.2	None
3	AV node	0.02 – 0.05	40 – 55
4	Bundle of His	1.2 – 2.0	25 – 40
5	Bundle branches	2.0 – 4.0	25 – 40
6	Purkinje network	2.0 – 4.0	25 – 40
7	Ventricular myocardium	0.3 – 1.0	None

Exit: critical writing

If a patient has a dysfunctional SA node, what problems do you think your patient will present with?

Warm-up

Define:

1. Myocyte
2. Automaticity
3. Action Potential
4. Ectopic

Understanding Depolarization and Repolarization (helpful videos)

Action potential of SA and AV nodes

review of action potentials

understanding sodium (NA+)/Potassium (K+) channels

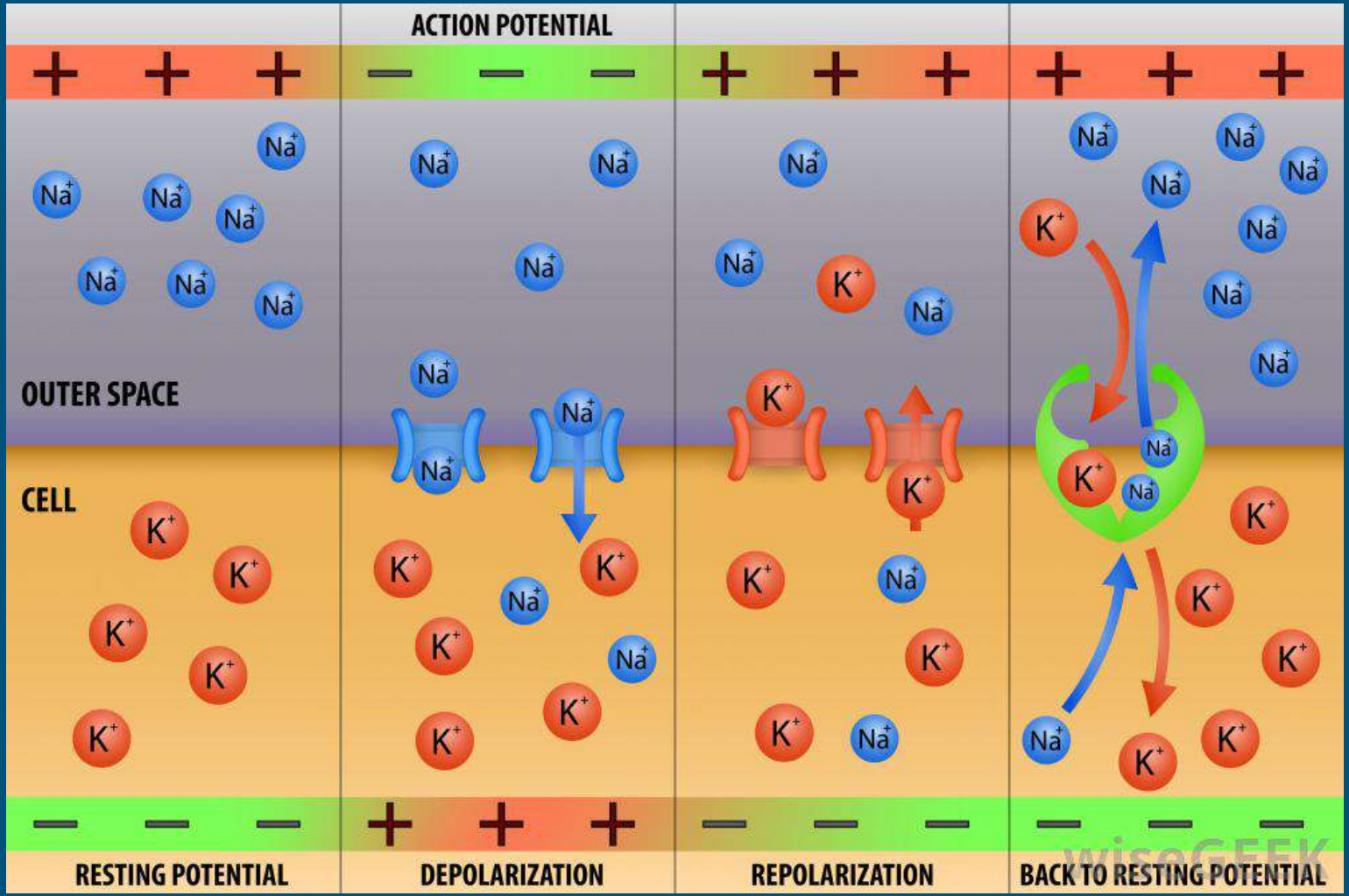
New: cardiac action potential

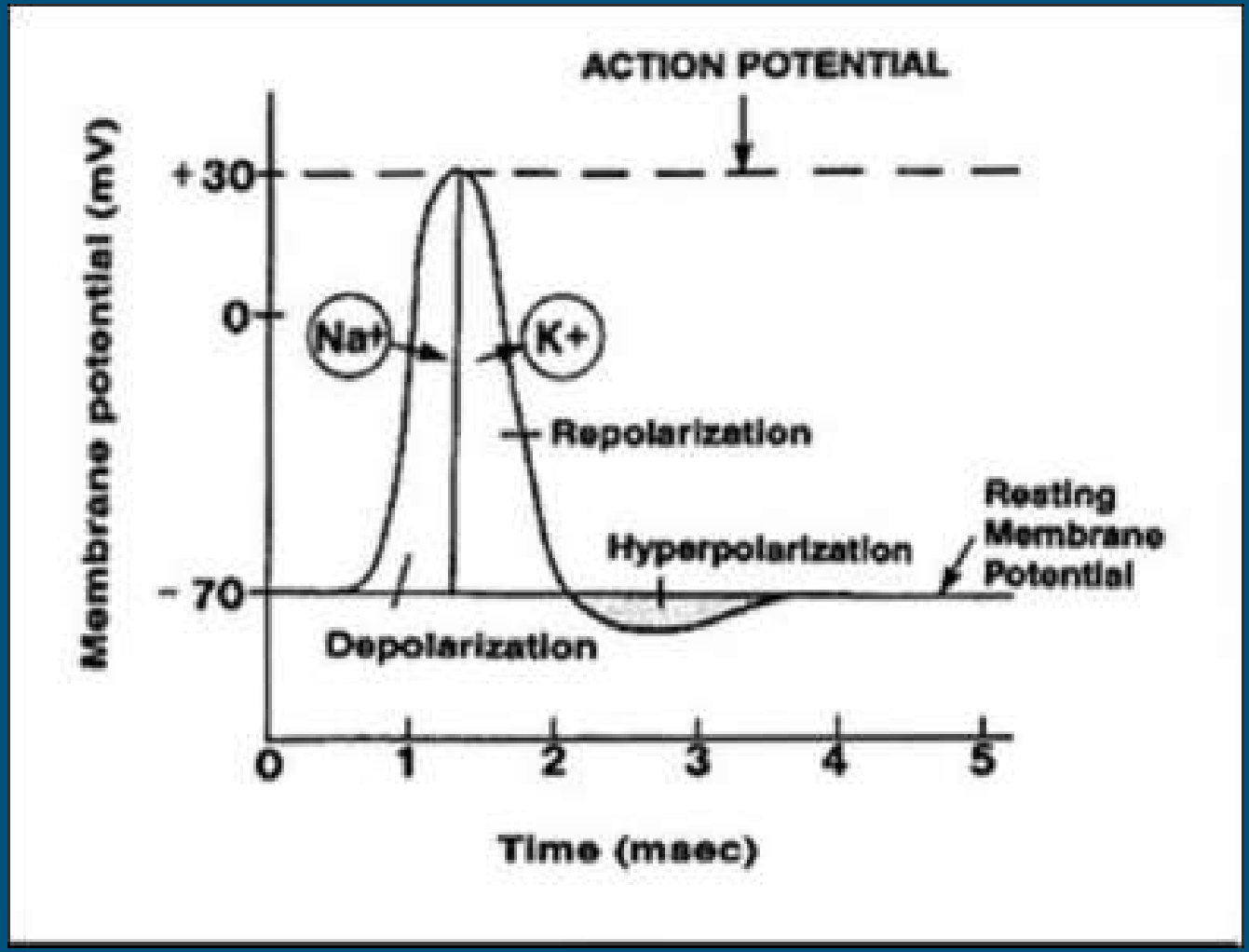
Depolarization

Loss of polarization; especially loss of the difference in charge between the inside and outside of the plasma membrane of a muscle or a nerve cell due to a change in permeability and migration of sodium ions to the interior

Repolarization

Restoration of the difference in charge between the inside and outside of the cell membrane following depolarization


ACTION POTENTIAL
OUTER SPACE
CELL
RESTING POTENTIAL
DEPOLARIZATION
REPOLARIZATION
BACK TO RESTING POTENTIAL


ACTION POTENTIAL
Membrane potential (mV)
+30
0
-70
Na+
K+
Repolarization
Hyperpolarization
Resting Membrane Potential
Depolarization
0
1
2
3
4
5
Time (msec)