

# 2.3 The action potential

Na

**Cellular Mechanisms of Brain Function** 

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### The action potential





#### **Hodgkin and Huxley**





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### Hodgkin and Huxley model for K<sup>+</sup> conductance



#### Activation



$$I_K = n^4 \cdot g_{K max} \cdot (V - E_K)$$

Hodgkin & Huxley (1952) A quantitative description of membrane current and its application to conduction and excitation in nerve. *Journal of Physiology* **117**: 500-544.











## The action potential



- The action potential is a brief (~1 ms) all-or-none signal in the membrane potential, initiated at a threshold voltage.
- The upstroke of the action potential is driven by positive feedback activation of voltagegated sodium channels. The downstroke is driven by voltagegated potassium channels.