

# Neuron Demo

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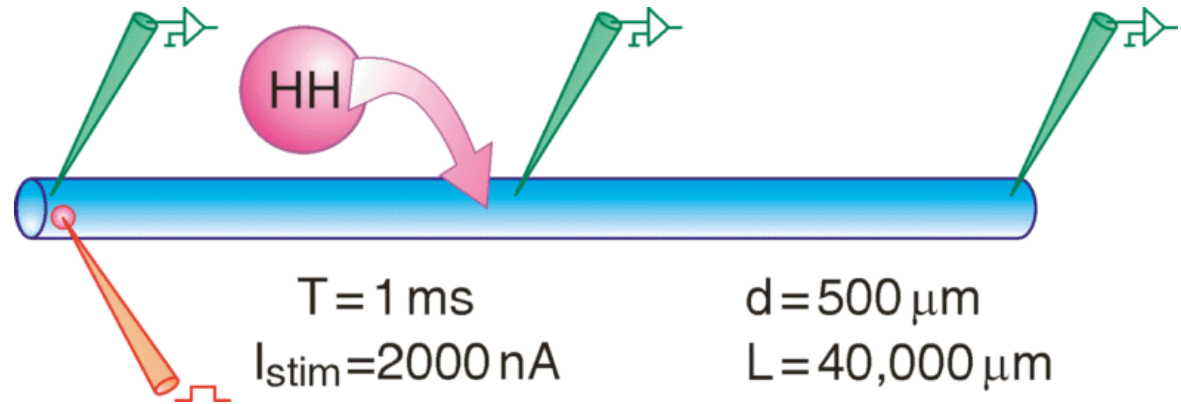
Center for Neural Science, NYU

# Model of an axon

```
create axon
access axon

axon nseg = 100
axon diam = 500
axon L = 40000
axon insert pas
axon Ra = 123
axon insert hh

objref stim
stim = new IClamp(0.5)
stim.del = 1
stim.dur = 1
stim.amp = 2000
tstop = 10
```



# Adding complexity

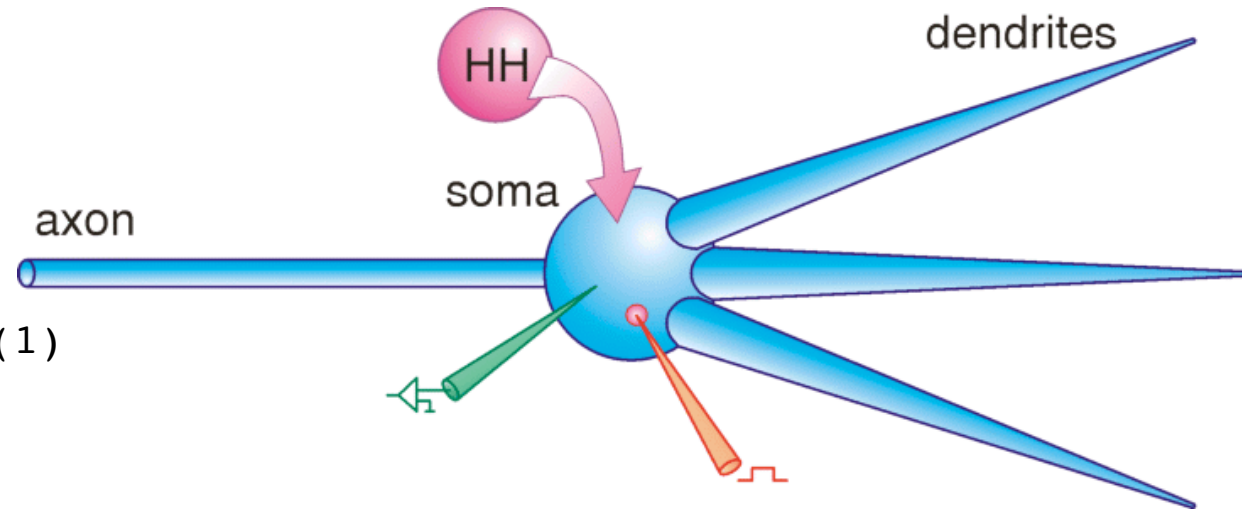
```
create soma, dend[3]
connect axon(0), soma(0)

for i=0,2 {
  connect dendrite[i](0), soma(1)
}

soma {
  nseg = 1
  L = 10
  diam = 10

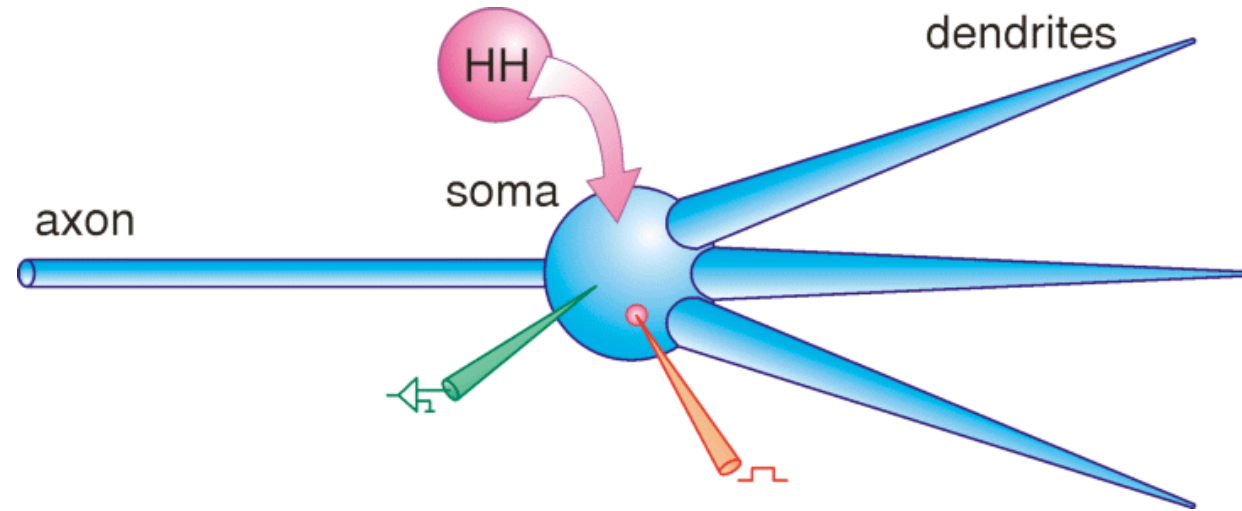
  insert pas
  e_pas = -65
  g_pas = 0.001

  insert hh
  gnabar_hh = 0.120
}
```



# Adding complexity

```
axon {  
  nseg = 20  
  L = 300  
  diam = 0.5  
  
  insert pas  
  e_pas = -65  
  g_pas = 0.001  
  
  insert hh  
  gnabar_hh = 0.120  
}
```

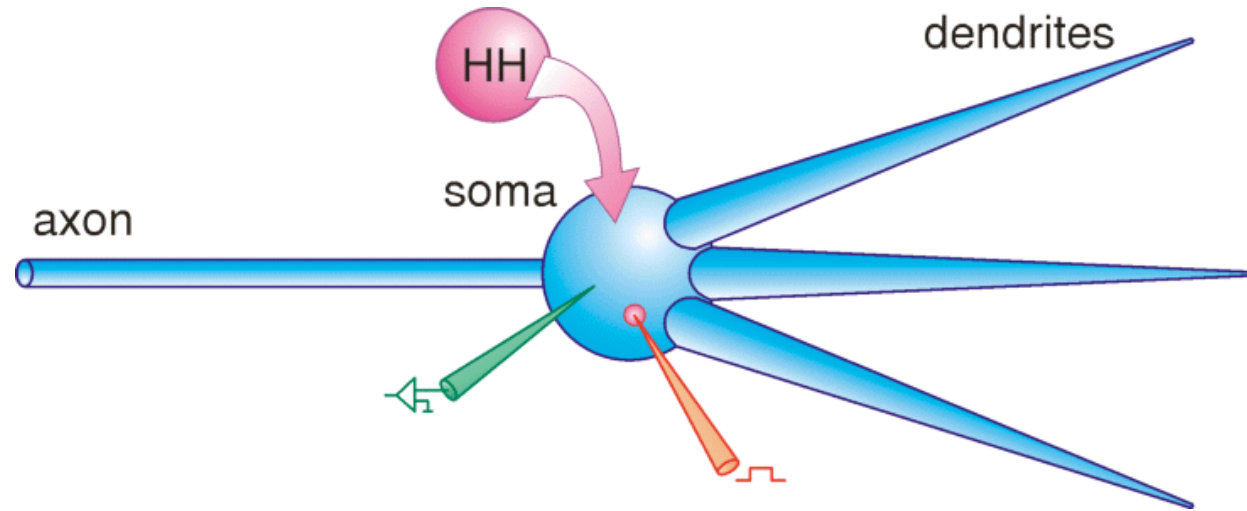


# Adding complexity

```
for i=0,2 dend[i] {  
  nseg = 5  
  L = 200  
  diam(0:1) = 2:0.1  
  
  insert pas  
  e_pas = -65  
  g_pas = 0.001  
}
```

```
objref stim  
soma stim = new IClamp(0.5)  
stim.del = 5  
stim.dur = 1  
stim.amp = 1
```

```
dt = 0.05  
tstop = 20
```

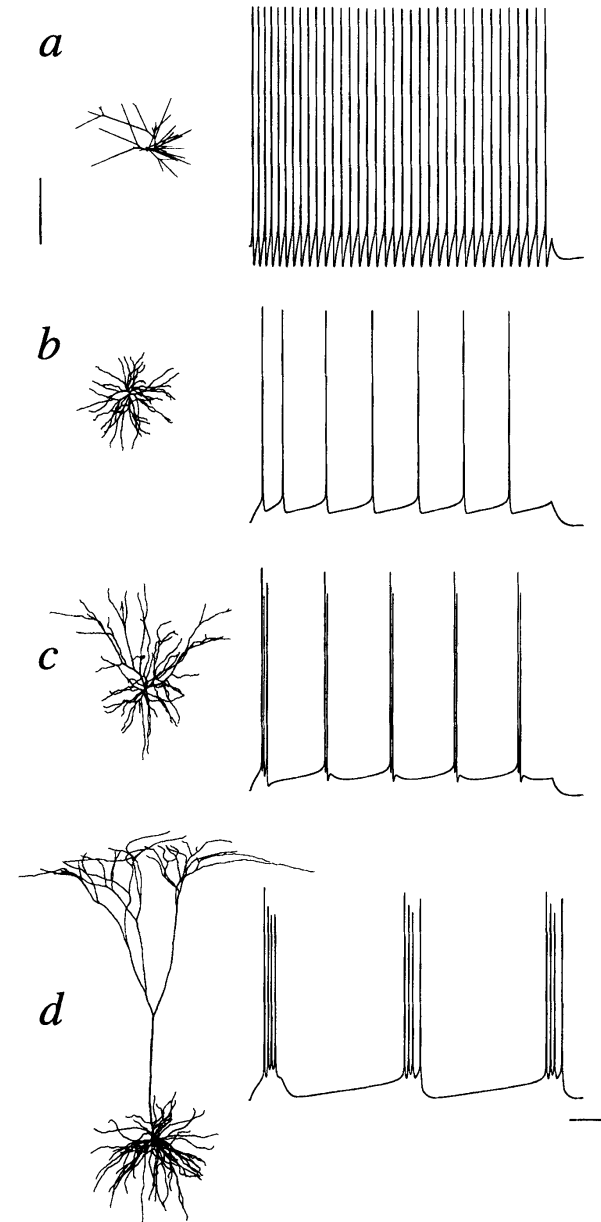


# Adding much more complexity

## Influence of dendritic structure on firing pattern in model neocortical neurons

Zachary F. Mainen\* & Terrence J. Sejnowski

NATURE · VOL 382 · 25 JULY 1996



# Programming in Neuron

- Two levels:
  - **hoc** scripting language
    - definition of neuronal models
    - basic I/O operations
    - control of simulation
    - data analysis
  - **nmodl**
    - description of biochemical/biophysical processes in terms of kinetic schemes or sets of differential and algebraic equations
    - C-like syntax; allows incorporation of routines written in C

# Websites

Neuron homepage: <http://www.neuron.yale.edu/neuron/>

- download software
- documentation
- users' group
- model database

Tutorial: <http://www.anc.ed.ac.uk/school/neuron/>

Model database: <http://senselab.med.yale.edu/modeldb/>

Morphology databases: e.g. <http://neuromorpho.org/>