

EMG Waveform

<http://www.youtube.com/watch?v=tJiWSfO3MTg>

A good example of Evoked potential and business (?) that utilizes it.



http://www.youtube.com/watch?v=k0uSpYd_lcs



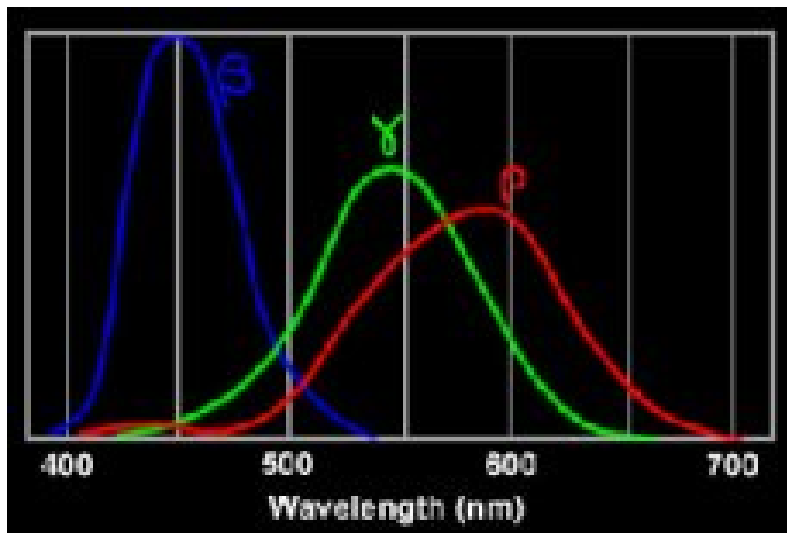
Intro. BME

Additional Viewgraphs for the Visual Signal Processing

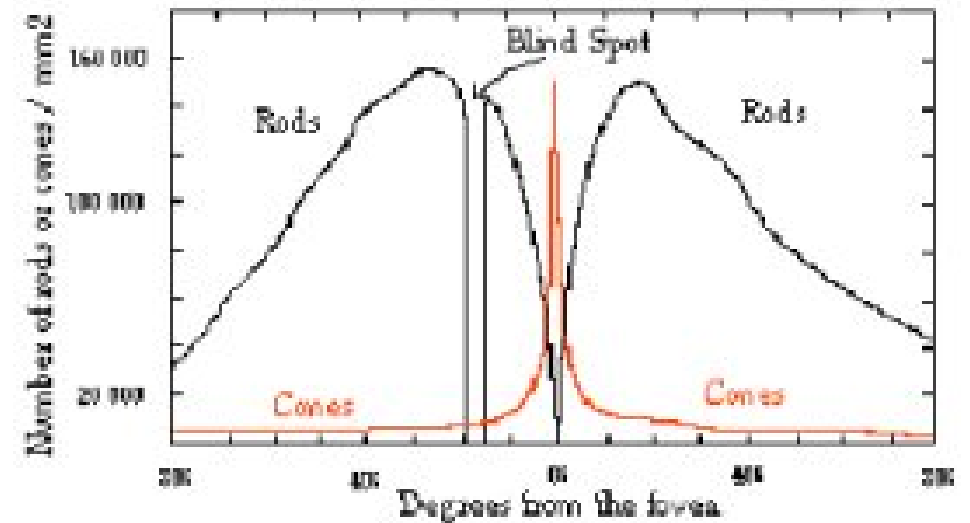


Photoreceptors

- Cone
 - Color discrimination
 - visual spectrum range: 400 – 700 nm
 - Rho (red: 580 nm)
Gamma (green: 540 nm) Beta (blue: 450 nm)

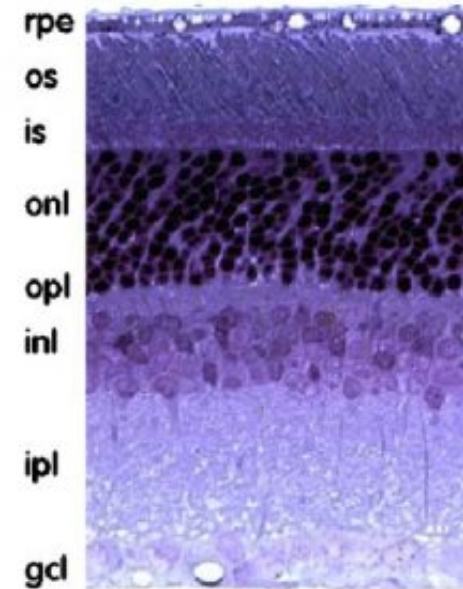


- Rod
 - far more numerous than cones
 - scotopic vision
 - responsible for our vision in dim light
 - do not work in bright light

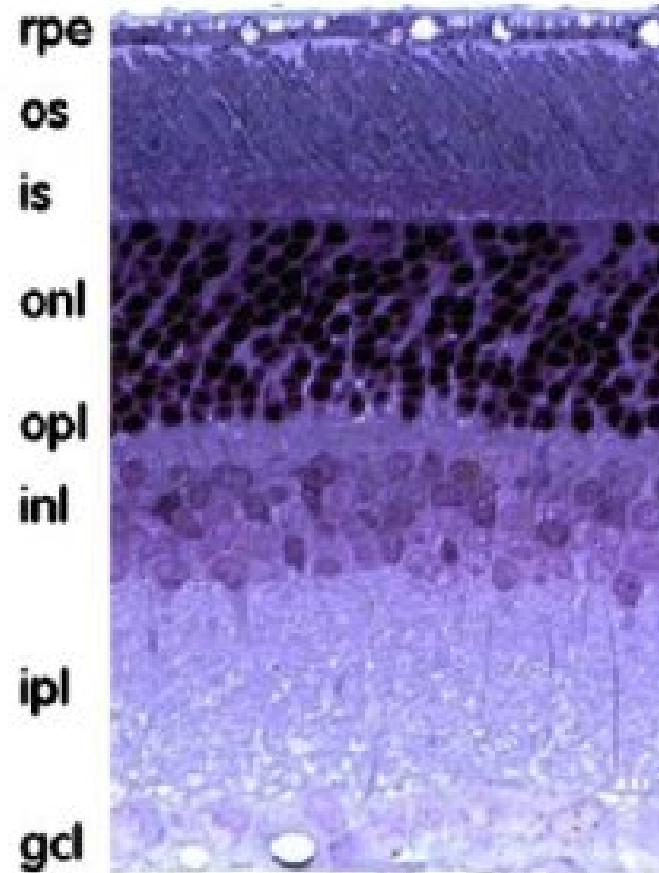
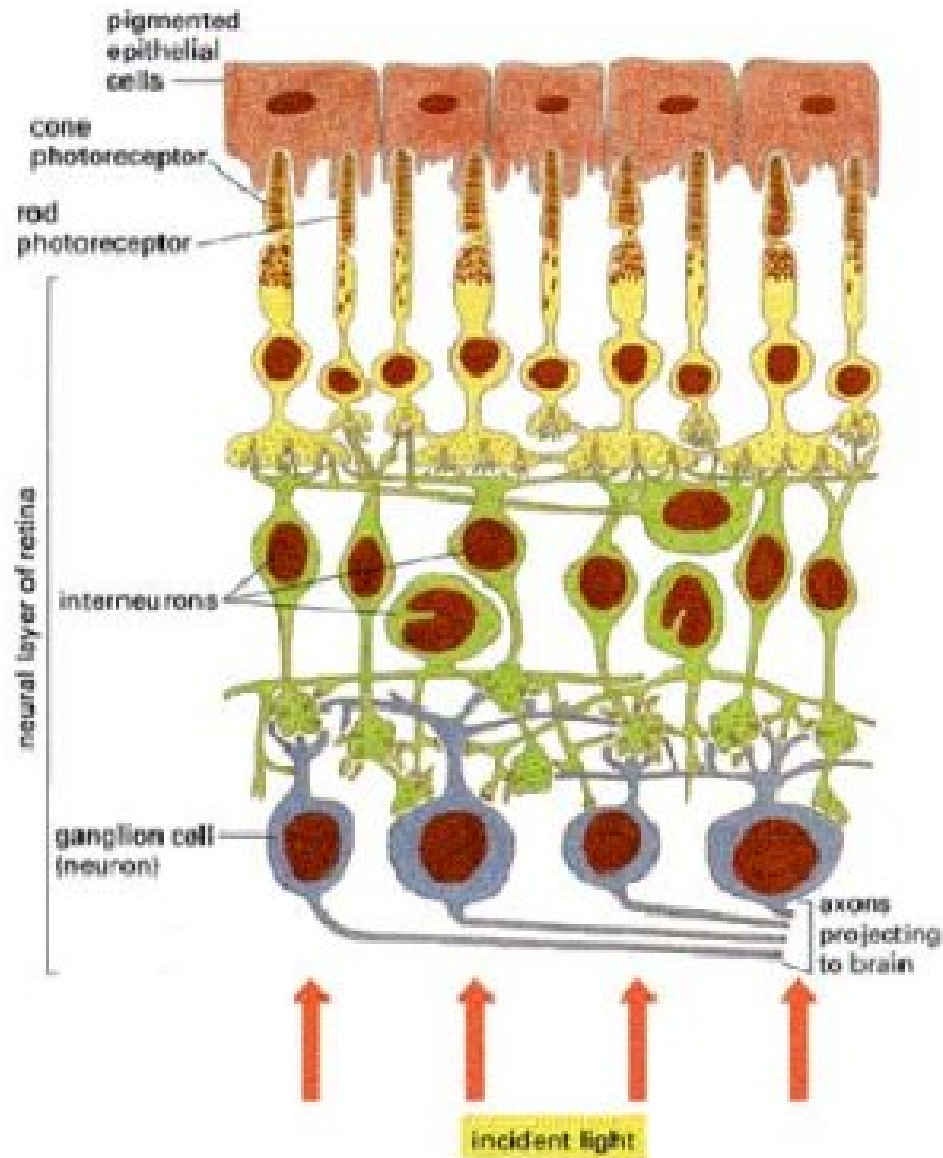


Retina

- Pigment epithelium(RPE): supporter
 - photopigment regeneration, blood supply
 - dark with melanin, decreasing light scatter
- Layer of photoreceptor cells
 - outer segments and inner segments of rod /cone
- Outer limiting membrane
- Outer Nuclear Layer (ONL)
 - cell bodies of rods & cones
- Outer Plexiform Layer (OPL)
 - rod and cone axons/ horizontal cell dendrites/ bipolar dendrites
- **Inner Nuclear Layer (INL)**
 - Nuclei of horizontal, bipolar and amacrine cells
- Inner Plexiform Layer (IPL)
 - axons of bipolars (and amacrine)/ dendrites of ganglion cells
- **Layer of Ganglion cells (GCL)**
 - nuclei of the ganglion cells / displaced amacrine cells
- Layer of optic nerve fibers
 - fibers from ganglion cells traversing the retina to leave the eyeball at the optic disc
- Internal limiting membrane

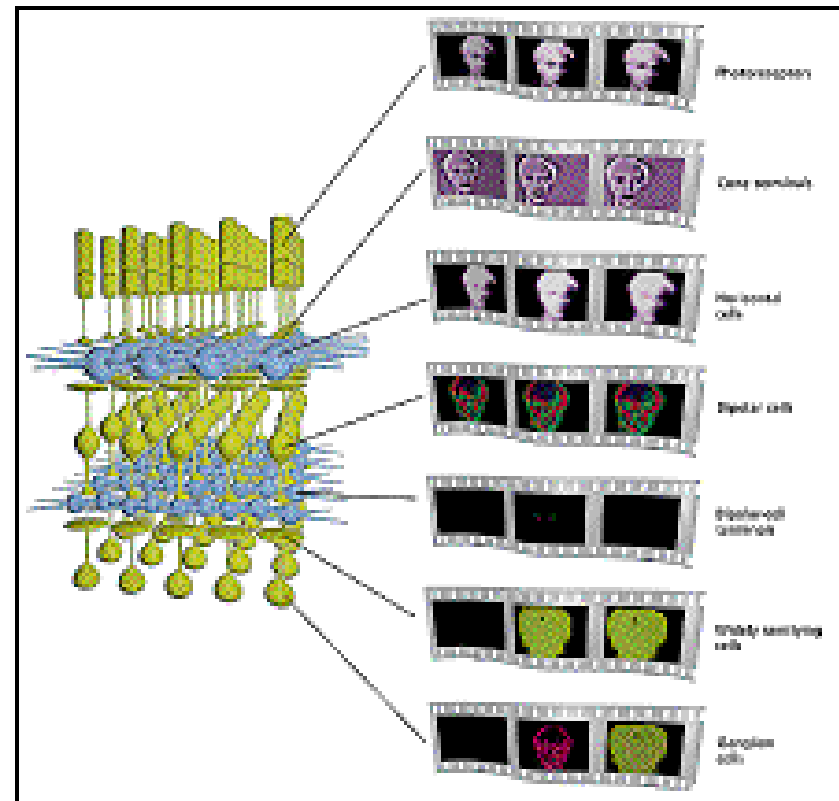


Intraretinal neural network



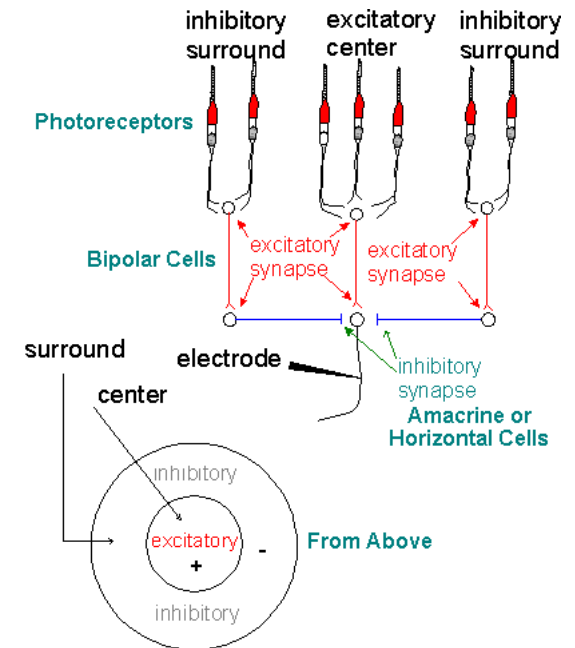
Contrast Information

- Convergence and Receptive Fields
 - individual receptors do not have private lines up to the visual cortex
 - multiple receptors converge onto single higher order neurons on their way to the higher visual centers
- Border information
 - begins within the retina itself
 - result of specialized arrangements of interneurons into center-surround ganglion cell receptive fields



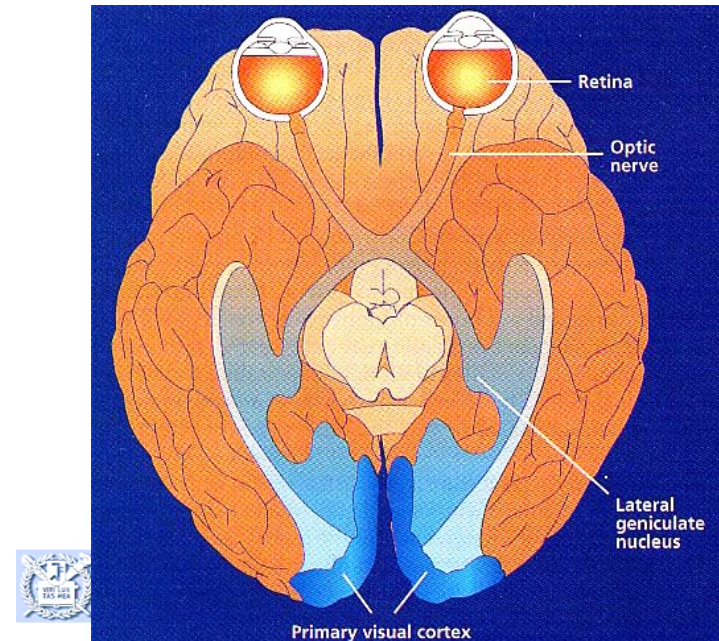
Center-Surround Receptive Field

- Bipolar cells(BC)
 - center of the receptive field
 - receive input from the photoreceptors
 - feed excitatory input onto GC
 - peripheral regions of the receptive field
 - feel excitatory information onto inhibitory cells
 - pass the inhibitory information to GC
- Ganglion cell(GC)
 - "on-center, off-surround": center is illuminated exclusively
 - a large amount of stimulation to GC, and no inhibition
 - "on-center, on-surround": whole field were stimulated
 - peripheral inhibitory influences would come into play



Interaction with brain

- Visual field; split in half and cross over
- Optic nerve → LGN → primary visual(striate) cortex
- Various "household chores" associated with vision
 - saccadic motion and compensation for it
 - the control of lens opening (pupillary reflex)
 - distance accommodation
 - binocular convergence

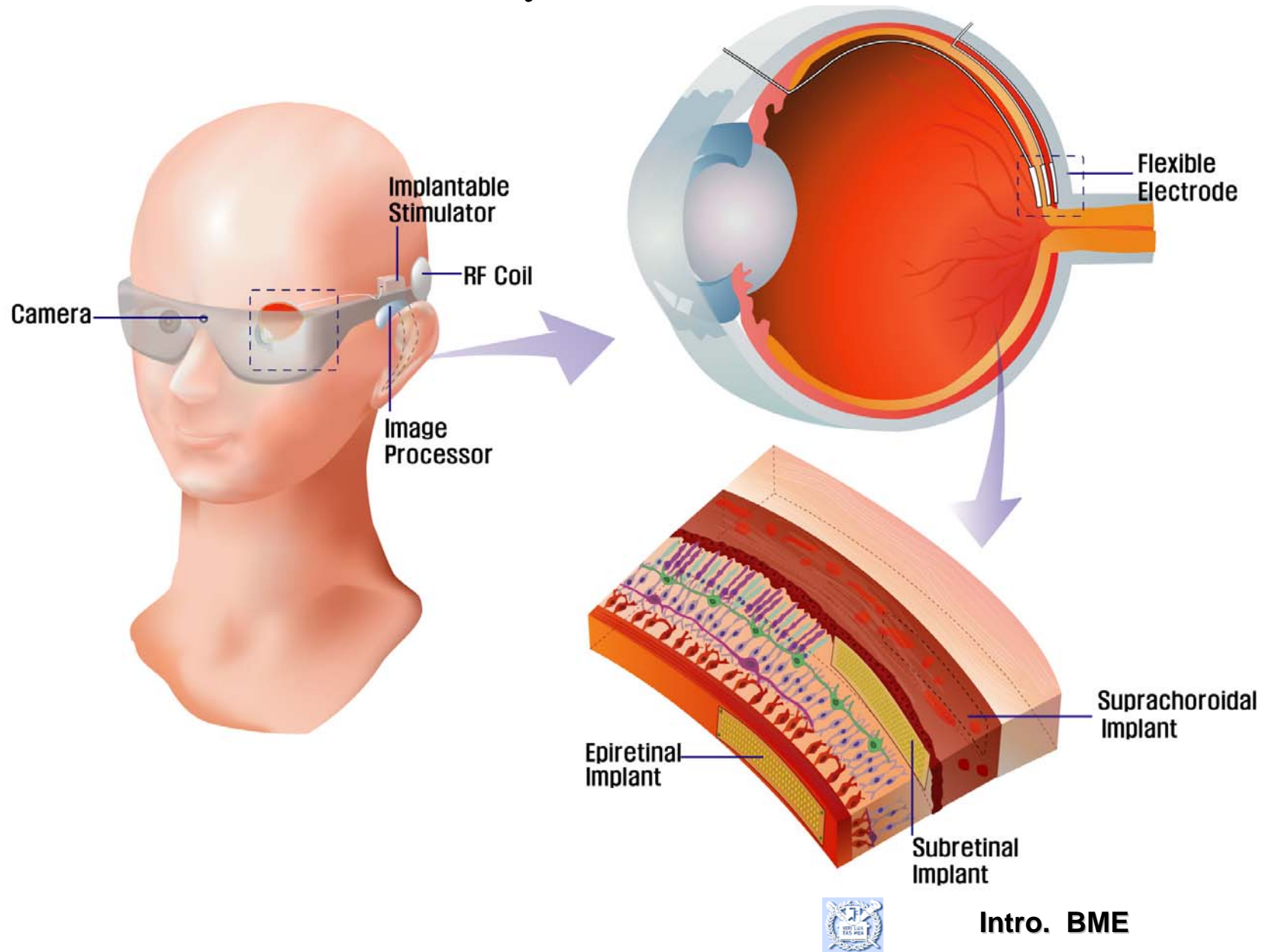


Visual Cortex

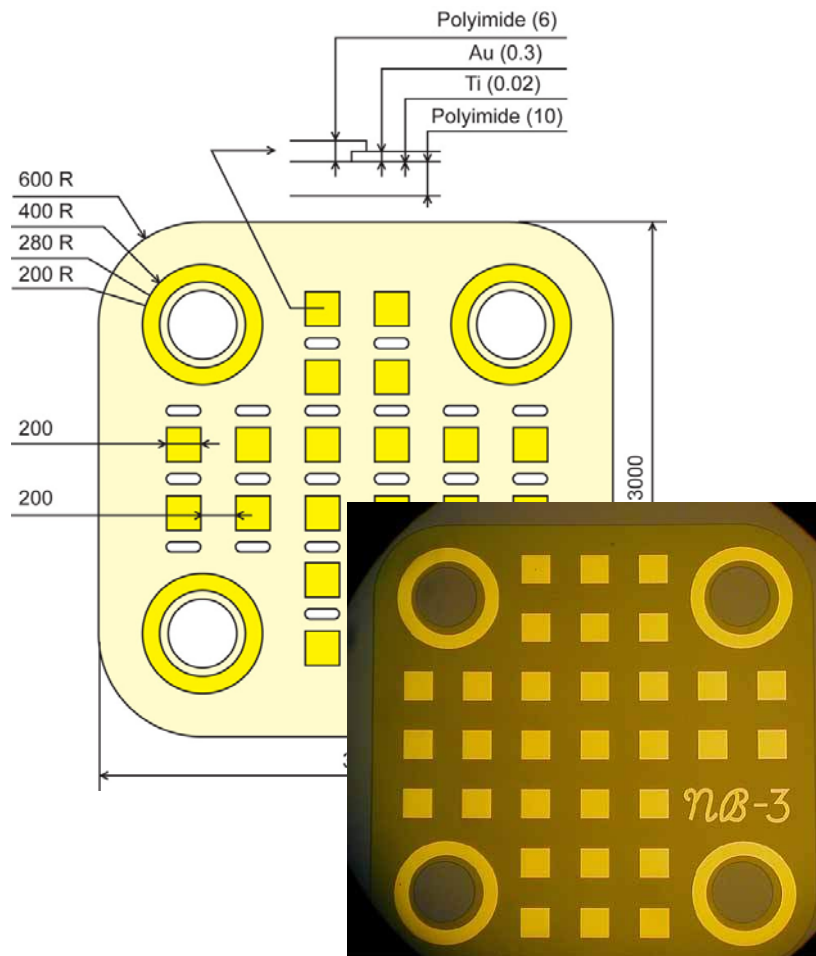
- Surface area of visual cortex
 - 10^5 neurons/mm² → 150×10^6 neurons/15cm²
 - mainly in fovea; 150,000cones → 1000neurons/cone
- Processing in primary visual cortex
 - mainly orientation response: direction of edge and line of visual images
 - fires when edge of particular orientation enters
 - all possible orientation; short line(9 neurons long)
- Dissection and reconstruction of visual image
 - face recognition
 - dissection of smaller pieces of eyes, ears,nose
 - see eyes, ears,nose → complete face → grandmother
 - all in a fraction of second



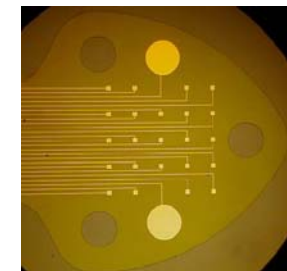
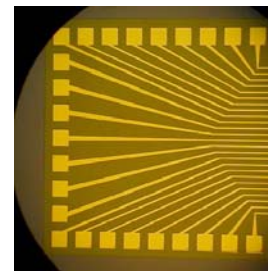
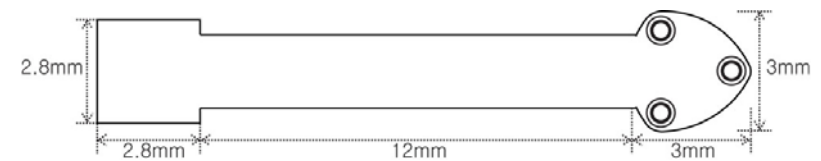
Seoul Artificial Retina System View (2007)



Polyimide MEA



- Polyimide **size**; 3mm x 3 mm
- Electrode **size**; 50 μm x 50 μm
- Electrode **number**; 25
- Site **interval**; 300 μm
- **Width** of interconnection line;
 - **Triangular** type : 10 μm
 - **Rectangular** type : 20 μm
- Overall **length**; 2.5 cm or 3 cm



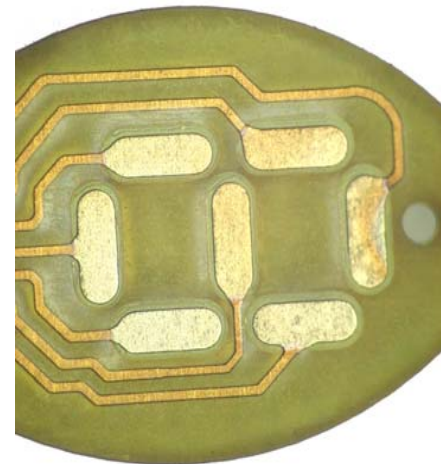
Intro. BME

2007 model

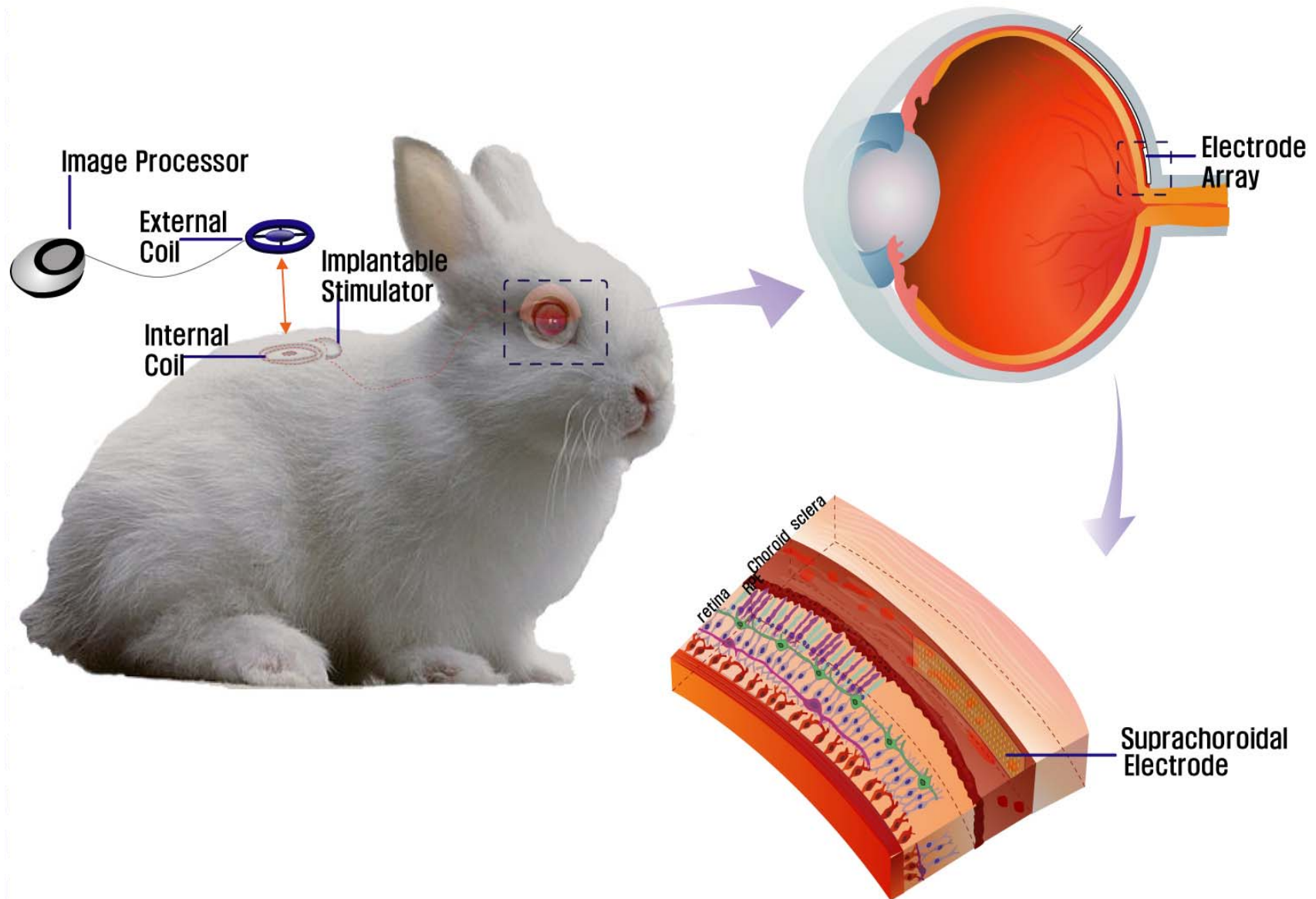


10 mm

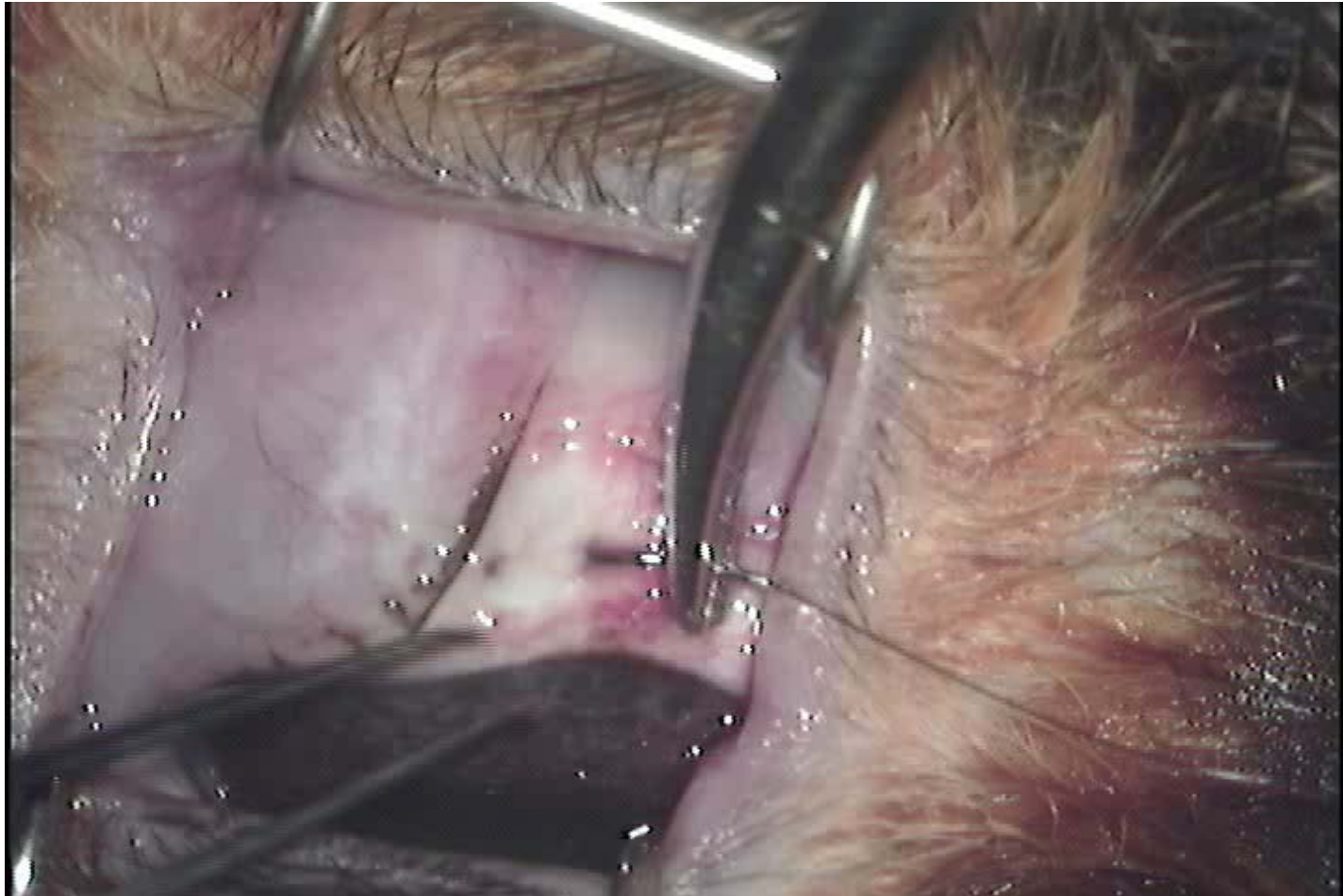
1. Active site: 750 μm x 300 μm
Impedance: 4–6 kohm
Head size: 4.28mm (L) x 3.13 mm (W)
2. Reference site: 1500 μm (D)
(2400 μm _ substrate)
200–600 ohm
3. Lead Length: 20 cm; Width: 1.63 mm
4. Electrode Thickness: 60 μm



SNU Artificial Retina System for Animal Experiment:



인공망막전극이식수술



Intro. BME