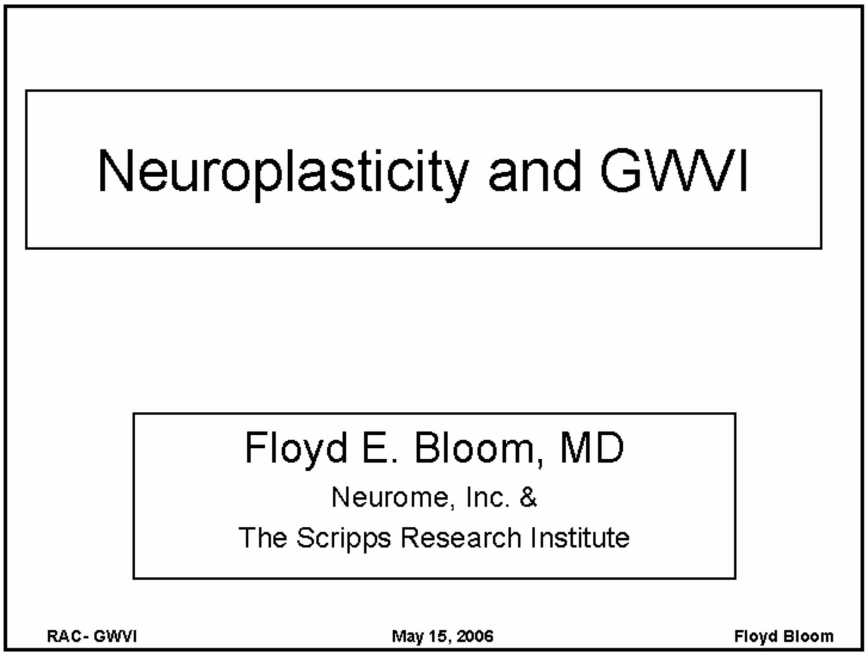
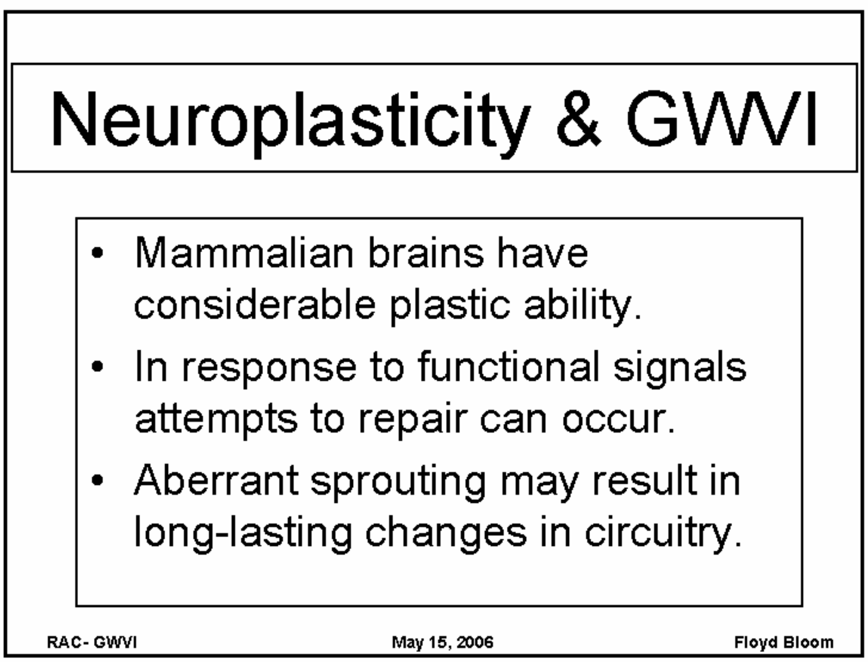
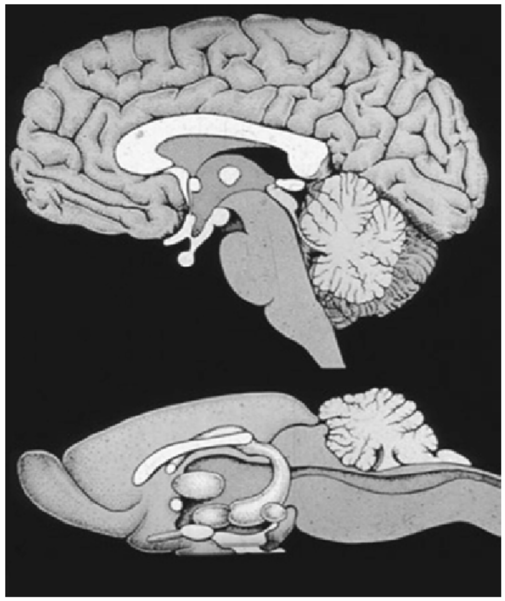
Presentation 6 – Floyd Bloom







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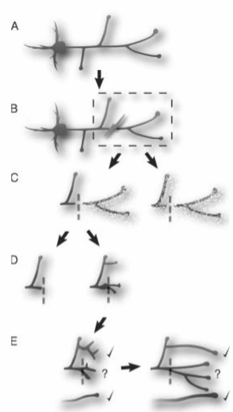
Mammalian brains have considerable (local) plastic ability.



Chuckowree,Dickson & Vickers, Neuroscientist 10:240,2005

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Mammalian brains have considerable plastic ability.

Brain Research, 59 (1973) 169–179 169

PROLIFERATION OF NOREPINEPHRINE-CONTAINING AXONS IN RAT CEREBELLAR CORTEX AFTER PEDUNCLE LESIONS

VIRGINIA M. PICKEL, HELMUT KREBS AND FLOYD E. BLOOM

Laboratory of Neuropharmacology, Special Mental Health Research Division, NIMH, Saint Elizabeths Hospital, Washington, D.C. 20032 (U.S.A.)

Mammalian brains have considerable plastic ability.

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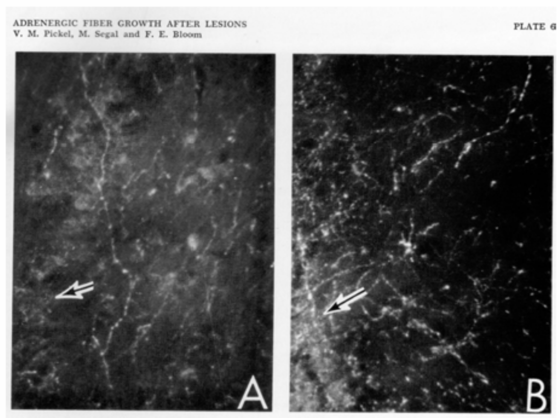
Axonal Proliferation Following Lesions of Cerebellar Peduncles. A Combined Fluorescence Microscopic and Radioautographic Study

VIRGINIA M. PICKEL,[1] MENAHEM SEGAL AND FLOYD E. BLOOM
Laboratory of Neuropharmacology, Special Mental Health Research Division IRP, National Institute of Mental Health, Saint Elizabeths Hospital, Washington, D.C. 20032

Mammalian brains have considerable plastic ability.



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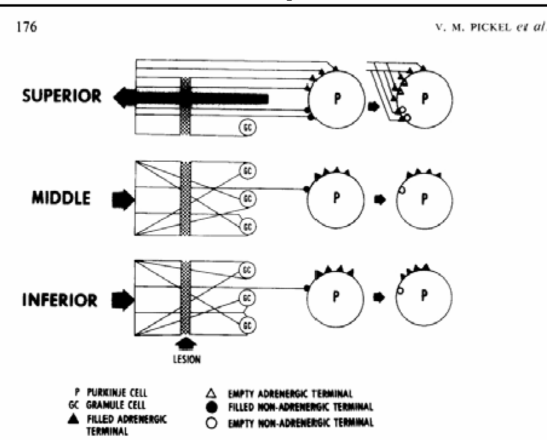
Mammalian brains have considerable plastic ability.



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Mammalian brains have considerable plastic ability.

- Injured peripheral nerves will regrow in periphery, not in CNS.
- Injured central axons can regrow through peripheral nerve bridges.

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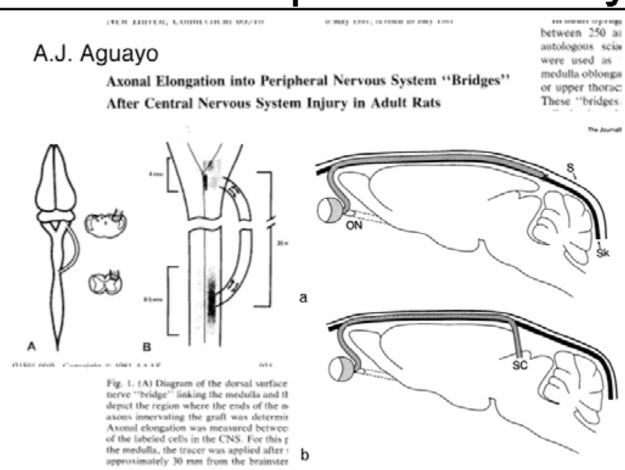
Mammalian brains have considerable plastic ability.



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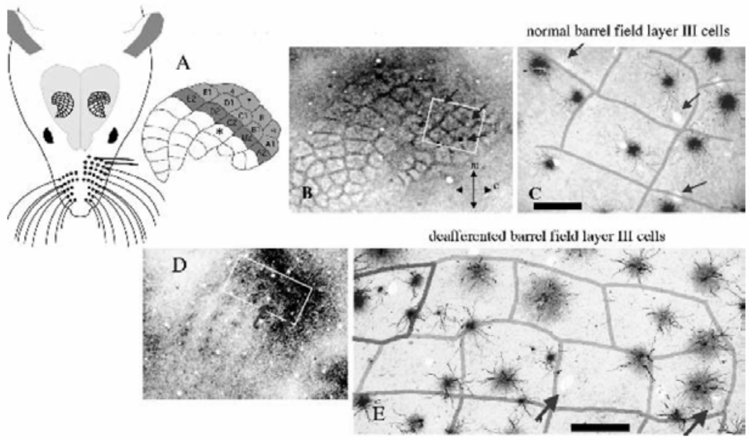
In response to functional signals attempts to repair can occur.



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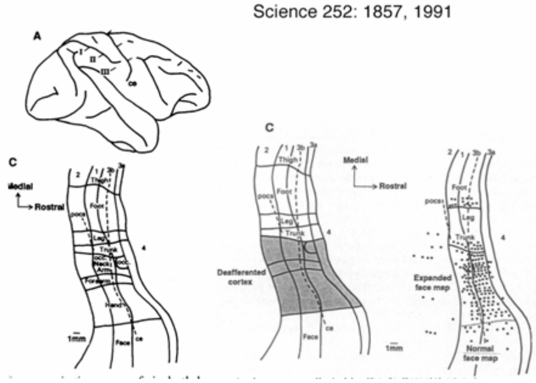
In response to functional signals attempts to repair can occur.

Massive Cortical Reorganization After Sensory Deafferentation in Adult Macaques

TIM P. PONS,* PRESTON E. GARRAGHTY, ALEXANDER K. OMMAYA, JON H. KAAS, EDWARD TAUB, MORTIMER MISHKIN

Science 252: 1857, 1991



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In response to functional signals attempts to repair can occur.

- To study effects in living subjects new ways to map have been developed: fMRI and NeuroMEG
- These show human brain's plastic ability.

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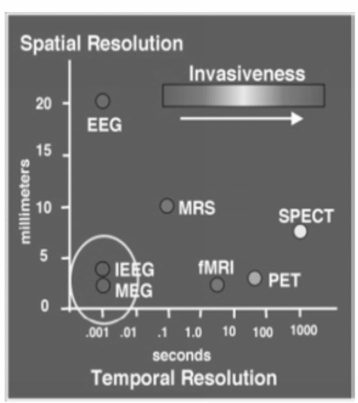
Scripps

Spatial and Temporal Resolutions for Various Functional Imaging Modalities



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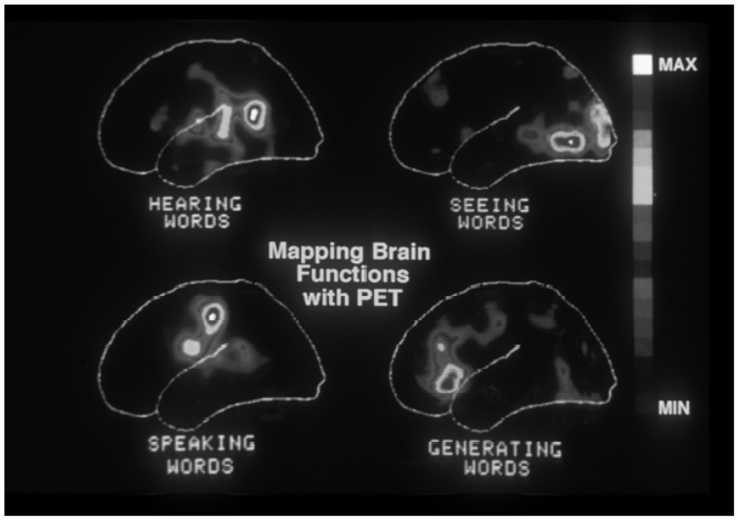

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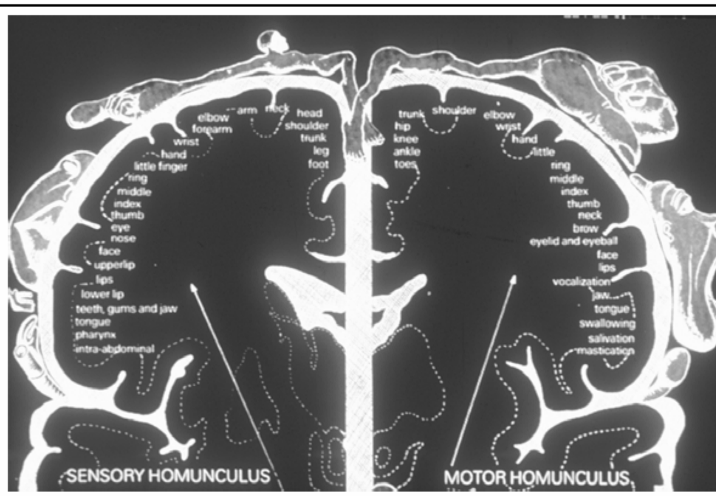
Human Brain Maps



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MEG

a non-invasive technique for localizing magnetic fields arising from sources of electrical activity within the human brain.

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MEG: Basic Concepts

- Measures magnetic fields generated by electrophysiological activity
- High temporal resolution (ms)
- High spatial resolution ($<1cm^3$)
- Magnetic fields can be detected outside the skull and are not affected by intervening tissues
- Spatial distributions of magnetic fields are analyzed to localize their sources within the brain
- Locations of sources are superimposed on an MRI to provide information about structure and function of the brain

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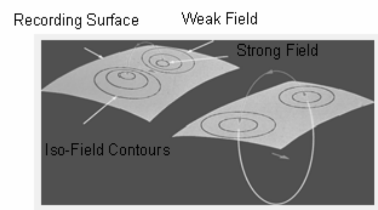
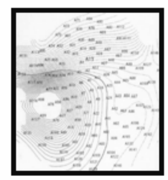
MEG: Basic Concepts

The current dipole generating the measured magnetic field lies midway between the two extrema

- The greater the distance between the extrema, the deeper the dipole

Magnetic Field Pattern





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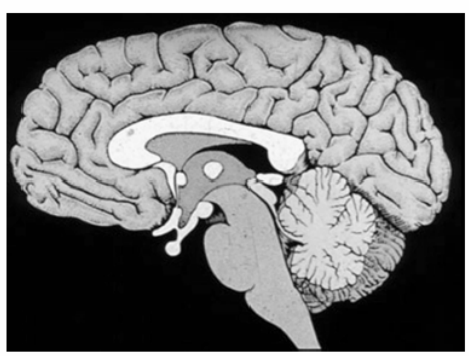
MEG: Basic Concepts



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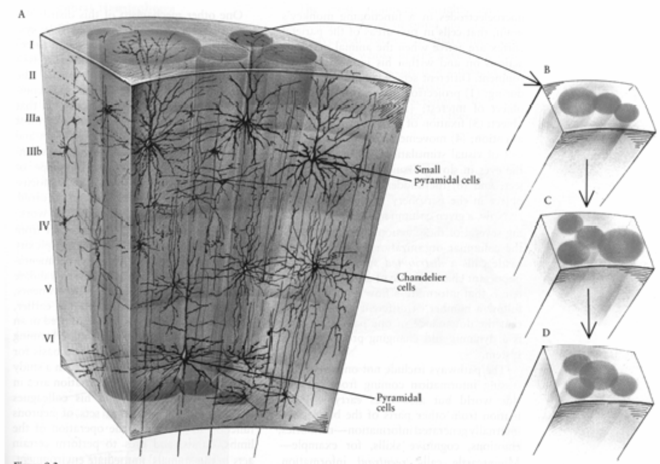
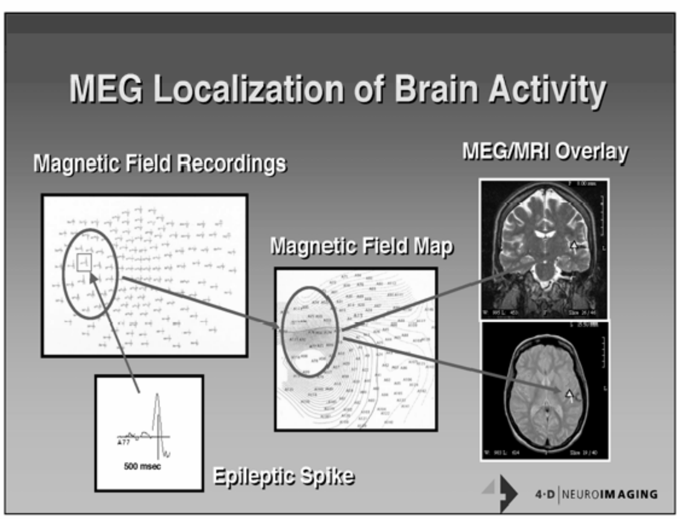
MEG: Basic Concepts



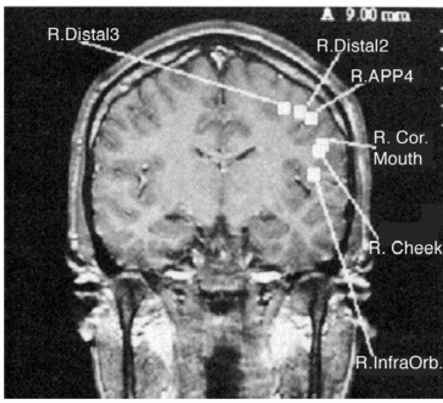


Proc. Natl. Acad. Sci. USA
Vol. 90, pp. 3098–3102, April 1993
Neurobiology

Noninvasive somatosensory homunculus mapping in humans by using a large-array biomagnetometer

T. T. Yang*†‡, C. C. Gallen*, B. J. Schwartz*§, and F. E. Bloom*

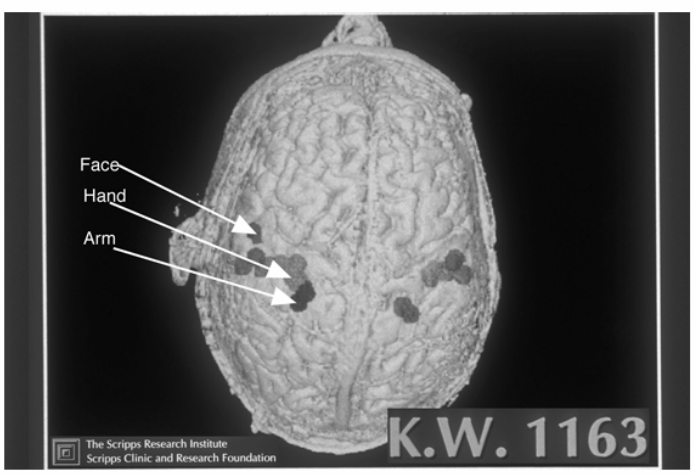
rtment of Molecular Pathology, University of California at San



tion of the sources of variability using a single ECD
s been carried out for repeated measures within one
1).

METHODS

nsory stimulus-evoked magnetic brain activity gen-
the left and right cortex in two neurologically
dergraduate male subjects was recorded inside of
cally shielded room by using a Magnes 37-channel
ometer (Biomagnetic Technologies, San Diego).
magnetic field pattern was recorded over a 144-
ter circular area above the parietotemporal cortex.
oise in each channel was $<10\ fT/Hz^{1/2}$ in all but
el.
magnetometer was placed over the contralateral
e relative to the side being stimulated. Subjects
ucted to hold extremely still, and to count silently
r of stimuli.
stimulators provided skin surface stimulation. The
s, which were circular rubber bladders of 1 cm
ncased within a plastic outer shell, expanded with
each time period corresponding to a single stimu-
g each expansion, the stimulator provided a light,
pressure stimulus to the skin surface. At each
n site, a series of 256, 512, or 1024 stimuli were



Aberrant sprouting may result in long-lasting changes in circuitry.

46 V. M. PICKEL, M. SEGA

TABLE 1

Radioautographic labeled terminals in control rats and rats with partially lesioned superior cerebellar peduncles; data are expressed as mean number of labeled structures/540 n^2, ± standard error for 20 samples in each region

Brain regions	Control	Lesioned
Cerebellum	14.25 ± 2.25	39.35 ± 5.78 [1]
Dentate gyrus	7.75 ± 2.17	39.76 ± 6.05 [1]
Hippocampus-CA3	5.24 ± 1.11	23.72 ± 3.96 [1]

[1] $p = \leq 0.001$ (t-test).
n = 25.

Aberrant Responses Can Be Intra-Neuronal

Pergamon

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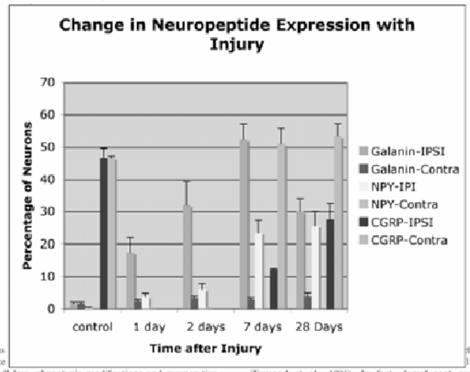
www.elsevier.com/locate/neuroscience

EFFECT OF PERIPHERAL NERVE INJURY ON DORSAL ROOT GANGLION NEURONS IN THE C57 BL/6J MOUSE: MARKED CHANGES BOTH IN CELL NUMBERS AND NEUROPEPTIDE EXPRESSION

T.-J. S. SHI,[a] T. TANDRUP,[b] E. BERGMAN,[a] Z.-Q. D. XU,[a] B. ULFHAKE[a] and T. HÖKFELT[a]*

[a]Department of Neuroscience, Karolinska Institutet, S-171 77 Stockholm, Sweden



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Aberrant Responses Can Be Intra-Neuronal

Annu. Rev. Neurosci.
2005. 28:377–401

The Plastic Human Brain Cortex

Alvaro Pascual-Leone, Amir Amedi,
Felipe Fregni, and Lotfi B. Merabet

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email: apleone@bidmc.harvard.edu

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Neuroplasticity and GWVI

Floyd E. Bloom, MD
Neurome, Inc. &
The Scripps Research Institute