Concentration-dependent plasticity

\[
\frac{dW_i}{dt} = \eta(Ca)\Omega(Ca) - \lambda W_i
\]

\[
\frac{d[Ca(t)]}{dt} = I_{\text{NMDA}(t)} - \frac{1}{\tau_{\text{Ca}}} [Ca(t)]
\]

Network dysfunction

Cortico-hippocampal system

Synaptic plasticity

Memory deficit (mouse)

Memory deficit (human)

Pre- and postsynaptic positive feedback

Theta-gamma rhythm generator

Concentration-dependent plasticity

Reduced presynaptic efficacy

Postsynaptic depression

APP/\alpha\beta levels

Low

Intermediate

High

Survival (%)

Age (months)

AD brain changes start decades before symptoms show

Amenitic MCI: memory problems; other cognitive functions OK; brain compensates for changes

Cognitive decline accelerates after AD diagnosis

Normal age-related memory loss

Total loss of independent function

Healthy Aging

Anemic MCI

Clinically Diagnosed AD

Increased synchrony

EEG