

Time-Varying Network Models of Neurodegenerative Disease Spread in Biological Neural Networks



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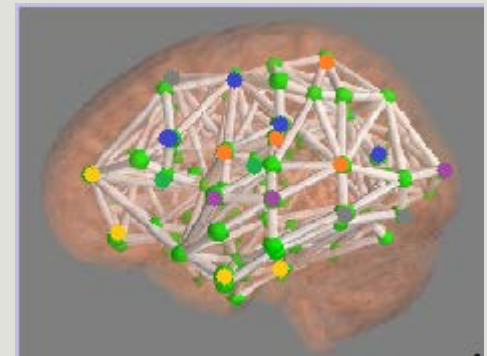
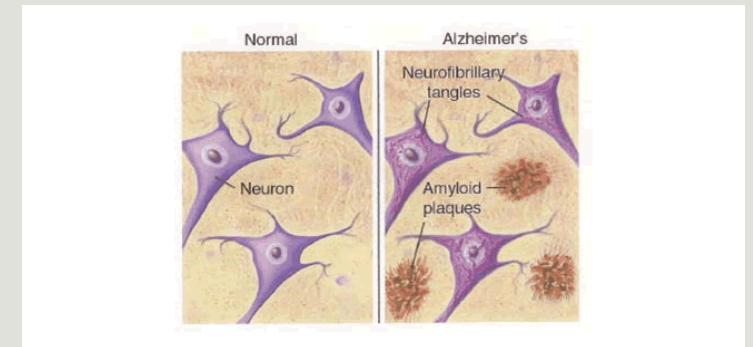
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Disease Spread of Alzheimer's in Biological Neural Networks

Alzheimer's is caused by mis-folded protein spreading and buildup

Biological neural network extracted from brain using advanced imaging and processing techniques

Network theory and analyses applied to extracted brain network to model protein spread

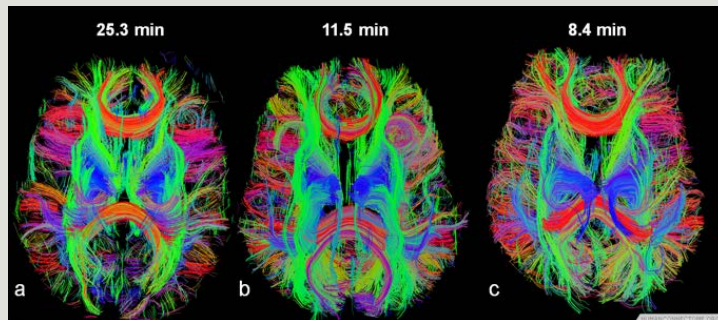


Spreading Models

TRACTOGRAPHY MODEL

Uses physical neuron connections to define spreading pathways

$$X_i(t+1) = \sum_{j \in N(i)} AX_j(t) + cX_i(t)$$



COVARIANCE MODEL

Uses idea that certain brain regions are more susceptible than others based on predefined conditions

$$X(t+1) = P(t)X(t) + cX(t)$$

Future Work

Work is ongoing

Compare which model can be a better predictor of disease spread based on real dynamical degeneration data

Compare which method better encodes spreading pathways

Apply model to other neurodegenerative diseases

Help in future treatment targeting

