

Brain Network

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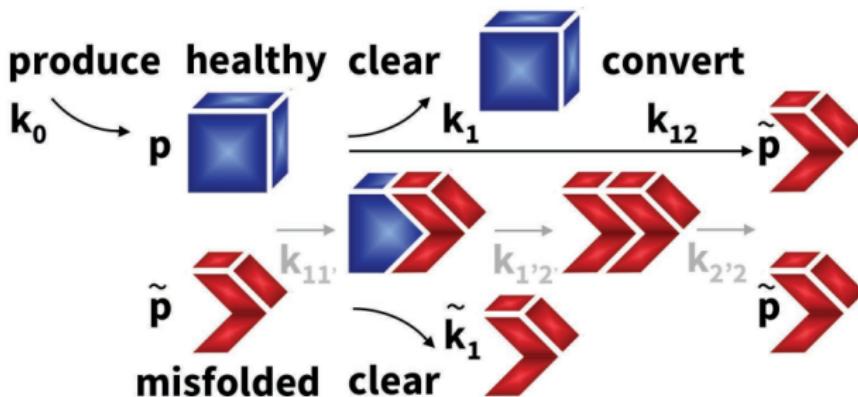


Modelli in letteratura

Modello Eterodimero:

$$\frac{\partial p}{\partial t} = \nabla \cdot (\mathbf{D}_p \nabla p) + k_0 - k_1 p - k_{12} p \tilde{p},$$

$$\frac{\partial \tilde{p}}{\partial t} = \nabla \cdot (\mathbf{D} \nabla \tilde{p}) - k_1 \tilde{p} + k_{12} p \tilde{p}.$$

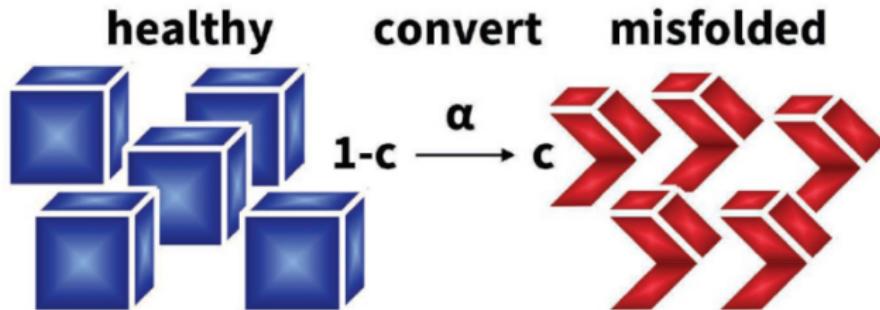


Modelli in letteratura

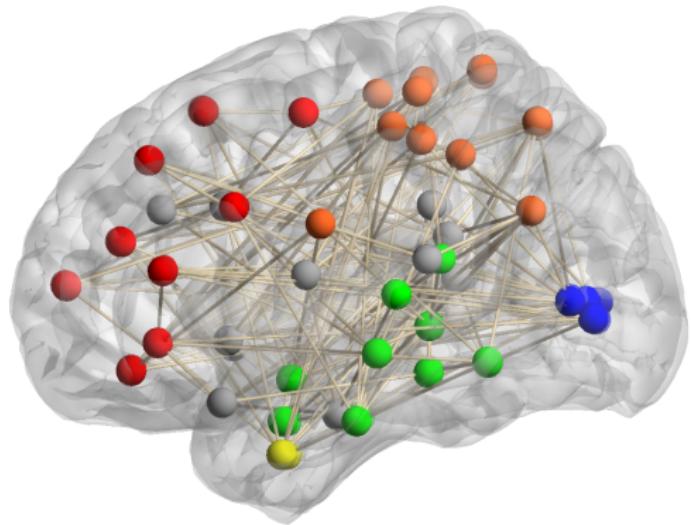
Modello Fischer-Kolmogorov:

sarebbe il *fast-reaction limit* del modello Eterodimero (assumo la formazione di eterodimeri istantanea)

$$\frac{\partial c}{\partial t} = \nabla \cdot (\mathbf{D} \nabla c) + \alpha c (1 - c)$$



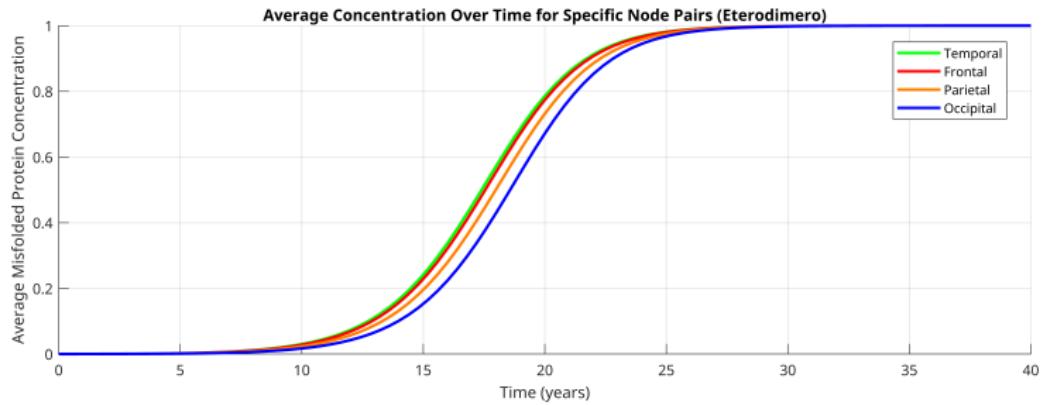
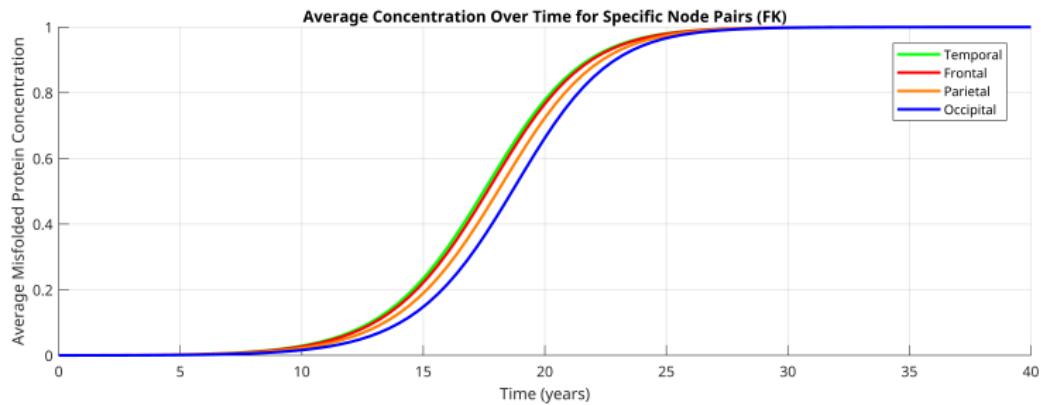
Brain Network

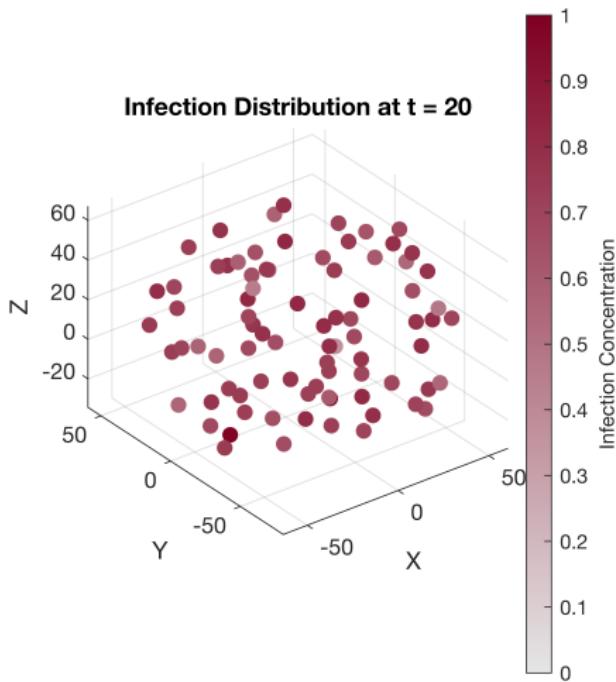
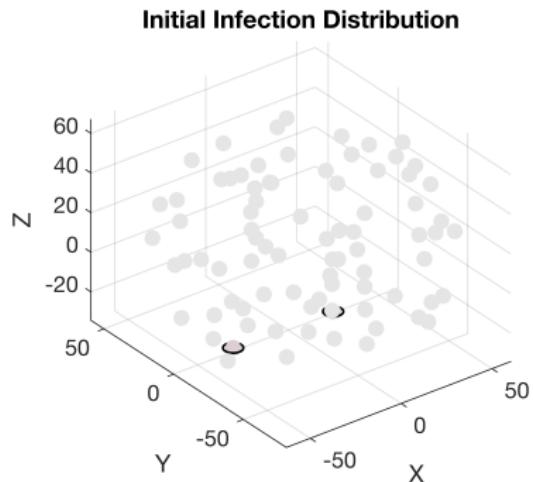


Legenda regioni cerebrali	
Regione Temporale	Green
Regione Frontale	Red
Regione Parietale	Orange
Regione Occipitale	Blue
Regione Entorinale	Yellow
Altre regioni	Grey

Gli archi mostrati rappresentano solo le connessioni il cui peso è superiore a 0.95.







Modello di propagazione soggetta all'invecchiamento

Algorithm 1: Modello di aging

Input: A , $\rho = 0.2$, $\Delta t = 0.4$, $T = 40$ anni

for $t = 0 : \Delta t : T$ **do**

$E \leftarrow \{(i,j) \mid A_{ij} > 0\};$

$M \leftarrow \lceil 0.8 |E| \rceil;$

$m \sim \text{UniformInt}(0, M);$

$S \leftarrow \text{sottoinsieme casuale di } E \text{ di dimensione } m;$

foreach $(i,j) \in S$ **do**

$A_{ij} \leftarrow \rho A_{ij};$

$A_{ji} \leftarrow \rho A_{ji};$

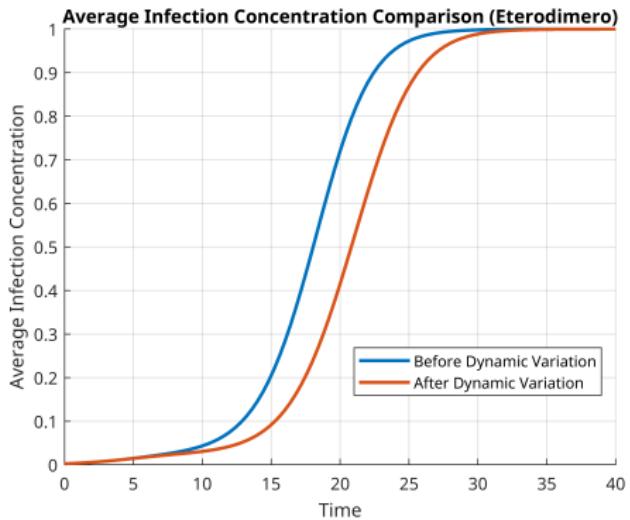
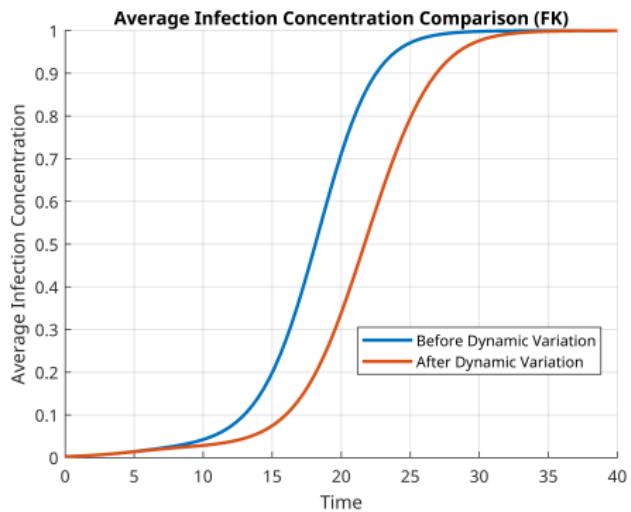
end

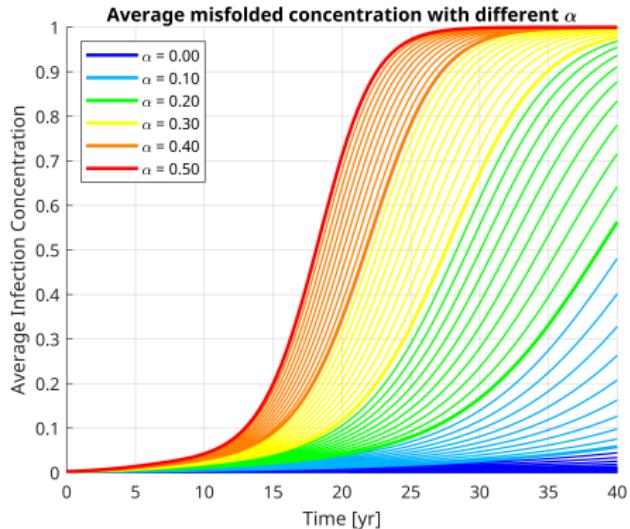
Aggiorna L e applica Forward–Euler del modello;

end

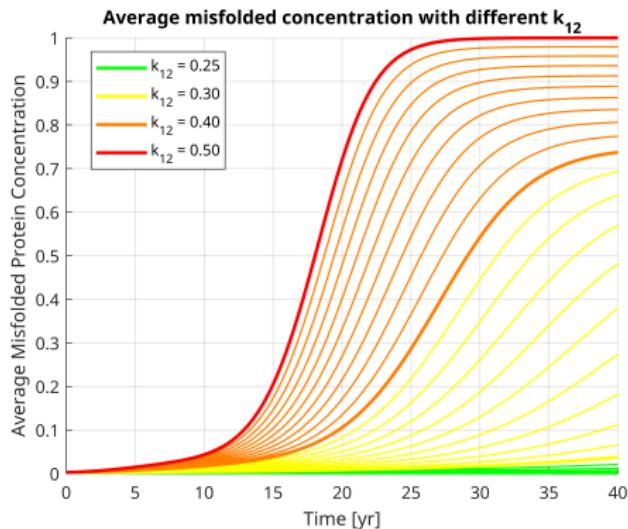


Simulazione di propagazione soggetta all'invecchiamento





Modello FK: andamento della concentrazione media per diversi valori del parametro di crescita α .



Modello eterodimero: andamento della concentrazione media per diversi valori del parametro di conversione k_{12} .



Modello di cura (post- t_{switch})

Algorithm 2: Modello di trattamento

Input: A , $\rho = 0.2$, $\Delta t = 1$, $T = 40$ anni, t_{switch} , $\theta = \{\alpha, k_{12}\}$

for $t = t_{\text{switch}} : \Delta t : T$ **do**

$E \leftarrow \{(i, j) \mid A_{ij} > 0\};$

$\min M \leftarrow \lfloor 0.2 |E| \rfloor;$

$\max M \leftarrow \lceil 0.5 |E| \rceil;$

$m \sim \text{UniformInt}(\min M, \max M);$

$S \leftarrow \text{sottoinsieme casuale di } E \text{ di dimensione } m;$

foreach $(i, j) \in S$ **do**

$A_{ij} \leftarrow \rho A_{ij};$

$A_{ji} \leftarrow \rho A_{ji};$

end

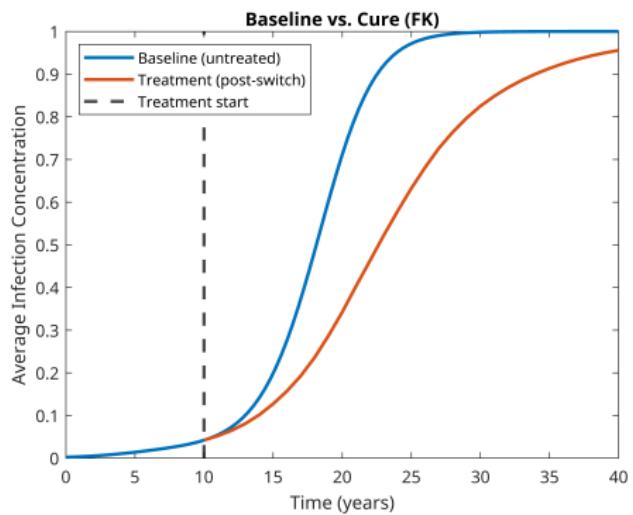
$\theta \leftarrow \theta \times \mathcal{U}(0.9, 1);$

Aggiorna L e applica Forward–Euler del modello;

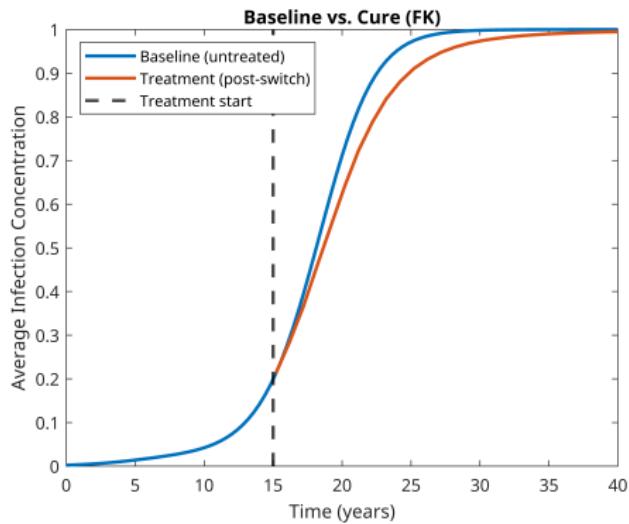
end



Caso di cura (FK)



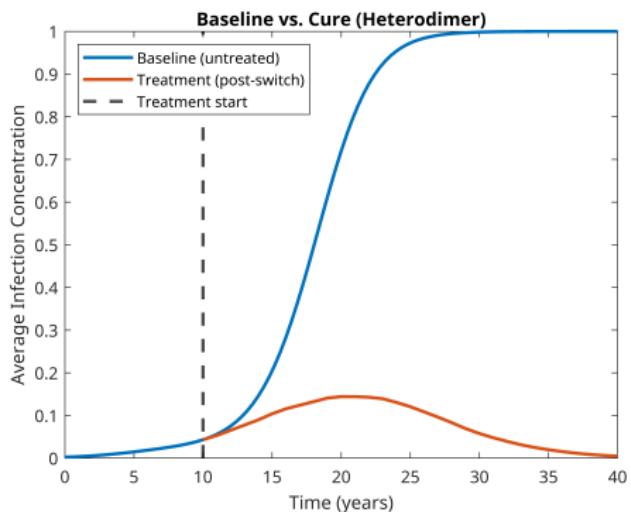
Inizio trattamento a $t = 10$ anni.



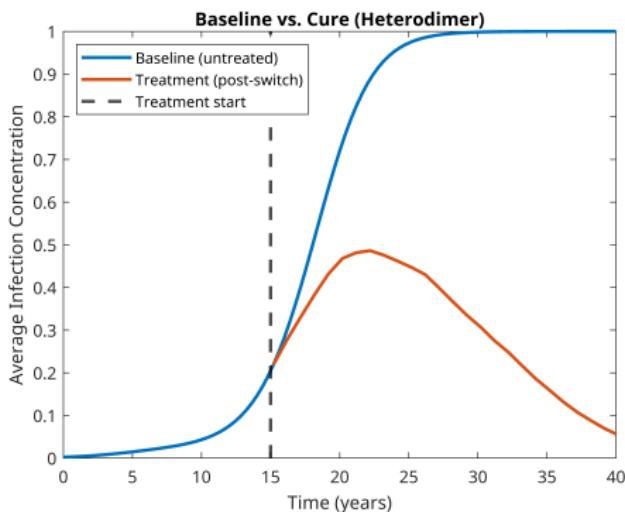
Inizio trattamento a $t = 15$ anni.



Caso di cura (Eterodimero)



Inizio trattamento a $t = 10$ anni.



Inizio trattamento a $t = 15$ anni.



