**Supplementary Table S2. Stochastic Parameters**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Deterministic variable | Stochastic description | Parameters | Dimension | Comment |
| *r*ASC | *r*(1+*ε*sin(Ω*t*+*σW*(*t*)+Δ))*r*ASC=0.0005*ε*ASC=0.99ΩASC=0.0045*σ*ASC=10 | *r*ASC is the basal proliferation rate of ASC. *ε* is the amplitude of stochastic fluctuation; *σ* is the bandwidth factor ; Δ is a random phase uniformly distributed in [0, 2π]. | Ω (h-1),Others are dimensionless | *r* > 0,0 ≤ *ε*< 1,  |
| *r*glioma | *r*(1+*ε*sin(Ω*t*+*σW*(*t*)+Δ))*r*glioma=0.0174*ε*glioma=0.99Ωglioma=0.1577*σ*glioma=10 | *r*glioma is the basal proliferation rate of glioma. | Ω (h-1),Others are dimensionless | *r* > 0,0 ≤ *ε*< 1,  |
| *r*astrocyte | *r*(1+*ε*sin(Ω*t*+*σW*(*t*)+Δ))*r*astrocyte=0.0174*ε*astrocyte=0.99Ωastrocyte=0.1577*σ*astrocyte=10 | *r*astrocyte is the basal proliferation rate of astrocyte. | Ω (h-1),Others are dimensionless | *r*>0,0 ≤ *ε*< 1,  |
| *r*microglia | *r*(1+*ε*sin(Ω*t*+*σW*(*t*)+Δ))*r*microglia=0.0174*ε*microglia=0.99Ωmicroglia=0.1577*σ*microglia=10 | *r*microglia is the basal proliferation rate of microglia. | Ω (h-1),Others are dimensionless | *r*>0,0 ≤ *ε*< 1,  |
| *p*glio\_astro | *p*(1+*ε*sin(Ω*t*+*σW*(*t*)+Δ));*p*glio\_astro=1×10-6*ε*glio\_astro=1Ωglio\_astro=0.1577*σ*glio\_astro=10 | *p*glio\_astro is the average proportion of dividing astroglia mutate to glioma during each cell cycle;  | Ω (h-1),Others are dimensionless | ,  |
| *p*glio\_ASC | *p*(1+*ε*sin(Ω*t*+*σW*(*t*)+Δ));*p*glio\_ASC=0.5*ε*glio\_ASC=1Ωglio\_ASC=0.0045*σ*glio\_ASC=10 | *p*glio\_ASC is the average proportion of dividing ASC differentiate to glioma during each cell cycle. | Ω (h-1),Others are dimensionless | ,   |
| *p*ASC\_glio | *p*(1+*ε*sin(Ω*t*+*σW*(*t*)+Δ));*p*ASC\_glio=1×10-4*ε*ASC\_glio=1ΩASC\_glio=0.1577*σ*ASC\_glio=10 | *p*ASC\_glio is the average proportion of dividing glioma dedifferentiate to ASC during each cell cycle. | Ω (h-1),Others are dimensionless | ,   |
| *c*QSC | ;*Y*k=1;*λ*=*c*QSC=1; | *c*QSC is the average rate of supply of quiescent glioma stem cell from normal neural stem cell;*ξ*(*t*) is Poisson white noise;*N*(*t*) is Poisson counting process giving the number of pulses that arrive in the time interval [0, *t*];*λ* is the mean arrival rate of *N*(*t*); |  |  |
| *c*microglia | ;*Yk*=1;*λ*=; | *c*microglia is the average rate of supply of microglia from monocytes; |  |  |
| *c*astroglia | ;*Y*k=1;*λ*=*c*astroglia; | *c*astroglia is the average rate of supply of astroglia from progenitors; |  |  |
| *ki* | *ki*max(0,1+*σN*(0,1)) | Truncated normal distribution |  |  |