GPCR ODE

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\begin{aligned}
\mathrm{L} + \mathrm{R} &\underset{\mathtt{k\_1inv}}{\overset{\mathtt{k\_1}}{\rightleftharpoons}} \mathtt{RL} \\
\mathtt{Gd} + \mathtt{Gbg} &\xrightarrow{\mathtt{k\_2}} \mathrm{G} \\
\mathtt{RL} + \mathrm{G} &\xrightarrow{\mathtt{k\_3}} \mathtt{Ga} + \mathtt{Gbg} + \mathtt{RL} \\
&\underset{\mathtt{k\_5}}{\overset{\mathtt{k\_4}}{\rightleftharpoons}} \mathrm{R} \\
\mathtt{RL} &\xrightarrow{\mathtt{k\_6}} \\
\mathtt{Ga} &\xrightarrow{\mathtt{k\_7}} \mathtt{Gd}
\end{aligned}
$$

$$\frac{\mathrm{d}R\left(t\right)}{\mathrm{d}t} = \mathtt{k\_4} + \mathtt{k\_1invRL}\left(t\right) - \mathtt{k\_5}R\left(t\right) - \mathtt{k\_1}R\left(t\right)L\left(t\right) \tag{1}$$

$$\frac{\mathrm{d}L\left(t\right)}{\mathrm{d}t} = \mathtt{k\_1invRL}\left(t\right) - \mathtt{k\_1}R\left(t\right)L\left(t\right) \tag{2}$$

$$\frac{\mathrm{d}\mathtt{RL}\left(t\right)}{\mathrm{d}t} = -\mathtt{k\_1invRL}\left(t\right) - \mathtt{k\_6RL}\left(t\right) + \mathtt{k\_1}R\left(t\right)L\left(t\right) \tag{3}$$

$$\frac{\mathrm{d}\mathtt{Gd}\left(t\right)}{\mathrm{d}t} = \mathtt{k\_7Ga}\left(t\right) - \mathtt{k\_2Gd}\left(t\right)\mathtt{Gbg}\left(t\right) \tag{4}$$

$$\frac{\mathrm{d}\mathtt{Gbg}\left(t\right)}{\mathrm{d}t} = -\mathtt{k\_2Gd}\left(t\right)\mathtt{Gbg}\left(t\right) + \mathtt{k\_3}G\left(t\right)\mathtt{RL}\left(t\right) \tag{5}$$

$$\frac{\mathrm{d}G\left(t\right)}{\mathrm{d}t} = \mathtt{k\_2Gd}\left(t\right)\mathtt{Gbg}\left(t\right) - \mathtt{k\_3}G\left(t\right)\mathtt{RL}\left(t\right) \tag{6}$$

$$\frac{\mathrm{d}\mathtt{Ga}\left(t\right)}{\mathrm{d}t} = -\mathtt{k\_7Ga}\left(t\right) + \mathtt{k\_3}G\left(t\right)\mathtt{RL}\left(t\right) \tag{7}$$