



	raw data	type I tensor	type II tensor
Synthetic data (case I)	$x_{i_k,j}^{(k)}$	$x_{i_1,i_2,j}$ $x_{\ell_1,i_1}^{(1)}, x_{\ell_2,i_2}^{(2)}, x_{\ell_3,j}$ $1 \leq i_1, i_2, \ell_1, \ell_2 \leq N(=1000), 1 \leq j, \ell_3 \leq M(=50)$	\tilde{x}_{i_1,i_2} $\tilde{x}_{\ell_1,i_1}^{(1)}, \tilde{x}_{\ell_2,i_2}^{(2)}, \tilde{x}_{\ell_3,j}^{(1)}, \tilde{x}_{\ell_3,j}^{(2)}$
Multi-omics (case I)	$x_{i_1,j}^{\text{mRNA}}, x_{i_2,j}^{\text{miRNA}}$	$x_{i_1,i_2,j}$ $x_{\ell_1,i_1}^{\text{mRNA}}, x_{\ell_2,i_2}^{\text{miRNA}}, x_{\ell_3,j}$ $1 \leq i_1, \ell_1 \leq 13393, 1 \leq i_2, \ell_2 \leq 755, 1 \leq j, \ell_3 \leq 161$	\tilde{x}_{i_1,i_2} $\tilde{x}_{\ell_1,i_1}^{\text{mRNA}}, \tilde{x}_{\ell_2,i_2}^{\text{miRNA}}, \tilde{x}_{\ell_3,j}^{\text{mRNA}}, \tilde{x}_{\ell_3,j}^{\text{miRNA}}$
EGF treatment (case II)	$x_{i,t_1}^{\text{control}}, x_{i,t_2}^{\text{EGF}}$	$x_{t_1,t_2,j}$ $x_{\ell_1,t_1}^{\text{control}}, x_{\ell_2,t_2}^{\text{EGF}}, x_{\ell_3,i}$ $1 \leq t_1, \ell_1 \leq T_{\text{control}}(=14), 1 \leq t_2, \ell_2 \leq T_{\text{EGF}}(=14), 1 \leq i, \ell_3 \leq 39937$	\tilde{x}_{t_1,t_2} $\tilde{x}_{\ell_1,t_1}^{\text{control}}, \tilde{x}_{\ell_2,t_2}^{\text{EGF}}, \tilde{x}_{\ell_3,i}^{\text{control}}, \tilde{x}_{\ell_3,i}^{\text{EGF}}$
Vaccination (case II)	$x_{i,t_1}^{\text{P}}, x_{i,t_2}^{\text{D}}, x_{i,t_3}^{\text{NP}}$	—	\tilde{x}_{t_1,t_2,t_3} $\tilde{x}_{\ell_1,t_1}^{\text{P}}, \tilde{x}_{\ell_2,t_2}^{\text{D}}, \tilde{x}_{\ell_3,t_3}^{\text{NP}}, \tilde{x}_{\ell_4,i}^{\text{P}}, \tilde{x}_{\ell_4,i}^{\text{D}}, \tilde{x}_{\ell_4,i}^{\text{NP}}$ $1 \leq t_1, \ell_1 \leq T_{\text{P}}(=58), 1 \leq t_2, \ell_2 \leq T_{\text{D}}(=52), 1 \leq t_3, \ell_3 \leq T_{\text{NP}}(=72), 1 \leq i, \ell_4 \leq 22277$