

Combinatorial selective ER-phagy remodels the ER during neurogenesis

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Supplemental note 1. Equations used for the linear model.

Indicators/dummy variables:

$$x_{i1} = \begin{cases} 1 & \text{if } i\text{th sample contains FAM134A}^{-/-}/\text{C}^{-/-} \\ 0 & \text{if } i\text{th sample does not contain FAM134A}^{-/-}/\text{C}^{-/-} \end{cases}$$

$$x_{i2} = \begin{cases} 1 & \text{if } i\text{th sample contains FAM134A}^{-/-}/\text{B}^{-/-}/\text{C}^{-/-} \\ 0 & \text{if } i\text{th sample does not contain FAM134A}^{-/-}/\text{B}^{-/-}/\text{C}^{-/-} \end{cases}$$

$$x_{i3} = \begin{cases} 1 & \text{if } i\text{th sample contains FAM134A}^{-/-}/\text{B}^{-/-}/\text{C}^{-/-}/\text{TEX264}^{-/-} \\ 0 & \text{if } i\text{th sample does not contain FAM134A}^{-/-}/\text{B}^{-/-}/\text{C}^{-/-}/\text{TEX264}^{-/-} \end{cases}$$

$$x_{i4} = \begin{cases} 1 & \text{if } i\text{th sample contains FAM134A}^{-/-}/\text{B}^{-/-}/\text{C}^{-/-}/\text{TEX264}^{-/-}/\text{CCPG1}^{-/-} \\ 0 & \text{if } i\text{th sample does not contain FAM134A}^{-/-}/\text{B}^{-/-}/\text{C}^{-/-}/\text{TEX264}^{-/-}/\text{CCPG1}^{-/-} \end{cases}$$

The model below was then used to estimate beta coefficients (β) for each step-wise addition of ER receptor knockout(s) with inherent technical noise from the MS acquisition and reporter quantification.

$$Y = \beta_0 + \beta_{WT \rightarrow DKO} x_{i1} + \beta_{DKO \rightarrow TKO} x_{i2} + \beta_{TKO \rightarrow QKO} x_{i3} + \beta_{QKO \rightarrow PKO} x_{i4} + \epsilon_i$$

Thus:

$$\beta_0 + \epsilon_i \rightarrow \text{if } i\text{th sample is WT}$$

$$\beta_0 + \beta_{WT \rightarrow DKO} x_{i1} + \epsilon_i \rightarrow \text{if } i\text{th sample is a FAM134A}^{-/-}/\text{C}^{-/-} \text{ KO}$$

$$\beta_0 + \beta_{WT \rightarrow DKO} x_{i1} + \beta_{DKO \rightarrow TKO} x_{i2} + \epsilon_i \rightarrow \text{if } i\text{th sample is a FAM134A}^{-/-}/\text{B}^{-/-}/\text{C}^{-/-} \text{ KO}$$

$$\begin{aligned} &\beta_0 + \beta_{WT \rightarrow DKO} x_{i1} + \beta_{DKO \rightarrow TKO} x_{i2} + \beta_{TKO \rightarrow QKO} x_{i3} + \epsilon_i \\ &\rightarrow \text{if } i\text{th sample is a FAM134A}^{-/-}/\text{B}^{-/-}/\text{C}^{-/-}/\text{TEX264}^{-/-} \text{ KO} \end{aligned}$$

$$\beta_0 + \beta_{WT \rightarrow DKO} x_{i1} + \beta_{DKO \rightarrow TKO} x_{i2} + \beta_{TKO \rightarrow QKO} x_{i3} + \beta_{QKO \rightarrow PKO} x_{i4} + \epsilon_i$$

→ if i th sample is a FAM134A^{-/-}/B^{-/-}/C^{-/-}/TEX264^{-/-}/CCPG1^{-/-} KO