**This dataset includes all the data used for the FRET (Figure 3) and cell surface expression (Figure 4) analyses of “Unravelling the molecular interactions between α7 nicotinic receptor and a RIC3 variant associated with backward speech” -** [**https://doi.org/10.1007/s00018-024-05149-8**](https://doi.org/10.1007/s00018-024-05149-8)

**Figure 3** - **For underlying methods see “Confocal microscopy and acceptor photobleaching FRET” methods section of paper**

Four datafiles (Microsoft excel) are provided:

**FRET eGFP-RIC3 REP1.xlsx** – data collection for experimental replicate 1. Channel intensities for each FRET datapoint. One worksheet for each of six experimental conditions (a7-mCherry + eGFP-RIC3wt, a7-mCherry + eGFP-RIC3G88R, a7-mCherry + LCK-GFP (negative control), eGFP-RIC3wt + mCherry-ER3 (negative control), eGFP-RIC3G88R + mCherry-ER3 (negative control), mCherry-eGFP (positive control)). Pooled worksheet shows mean intensities for each cell under each condition.

**FRET eGFP-RIC3 REP2.xlsx** – data collection for experimental replicate 2. Channel intensities for each FRET datapoint. One worksheet for each of six experimental conditions (a7-mCherry + eGFP-RIC3wt, a7-mCherry + eGFP-RIC3G88R, a7-mCherry + LCK-GFP (negative control), eGFP-RIC3wt + mCherry-ER3 (negative control), eGFP-RIC3G88R + mCherry-ER3 (negative control), mCherry-eGFP (positive control)). Pooled worksheet shows mean intensities for each cell under each condition.

**FRET eGFP-RIC3 REP3.xlsx** – data collection for experimental replicate 3. Channel intensities for each FRET datapoint. One worksheet for each of six experimental conditions (a7-mCherry + eGFP-RIC3wt, a7-mCherry + eGFP-RIC3G88R, a7-mCherry + LCK-GFP (negative control), eGFP-RIC3wt + mCherry-ER3 (negative control), eGFP-RIC3G88R + mCherry-ER3 (negative control), mCherry-eGFP (positive control)). Pooled worksheet shows mean intensities for each cell under each condition.

**FRET eGFP-RIC3 REP4.xlsx** – data collection for experimental replicate 4. Channel intensities for each FRET datapoint. One worksheet for each of six experimental conditions (a7-mCherry + eGFP-RIC3wt, a7-mCherry + eGFP-RIC3G88R, a7-mCherry + LCK-GFP (negative control), eGFP-RIC3wt + mCherry-ER3 (negative control), eGFP-RIC3G88R + mCherry-ER3 (negative control), mCherry-eGFP (positive control)). Pooled worksheet shows mean intensities for each cell under each condition.

**FRET eGFP-RIC3 PooledDatasets.xlxs** – Combined data across four replicates. This data was used to plot Figure 3c.

**Figure 4** - **For underlying methods see “Functional expression of nAChR in Xenopus oocytes” methods section of paper**

One datafile (graphpad) is provided:

**FuncExpression.pzf** – amplitude of current responses elicited by application of a maximal ACh (1 mM) to impaled Xenopus oocytes. One hundred experiments were performed using 12–14 batches of transfected cell batches or ten *Xenopus* donors. Data are reported as mean ± SEM. To compare significant differences (at*p* < *0.05*) between more than two groups of data meeting assumptions of normality and equal variance, a one-way ANOVA was performed followed by a Tukey test for all pair-wise comparisons.