Structure of the Wnt signaling molecule (red) in complex with the Frizzled ligand-binding domain (yellow), schematically depicted as connected to the cell surface. A key feature of this structure is the visualization of a lipid group (blue) on Wnt directly engaging Frizzled. The Wnt/Frizzled mode of binding paves the way for the design of Wnt-based therapeutics. See page 59.

Image produced by Eric Smith and Chris Garcia
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Comment on “Perinuclear Mitochondrial Clustering Creates an Oxidant-Rich Nuclear Domain Required for Hypoxia-Induced Transcription”
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RESEARCH ARTICLE: Pharmacological Rescue of Mitochondrial Deficits in iPSC-Derived Neural Cells from Patients with Familial Parkinson’s Disease
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