

**Brl1 And Brr6 Mediate Membrane Fusion During Nuclear Pore Complex Biogenesis**

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The Nuclear Pore Complex (NPC) is the main channel for bidirectional transport between the nucleus and cytoplasm, playing a key role in cellular regulation and signaling. During NPC biogenesis, fusion of the inner and outer nuclear envelope membranes is crucial, especially in early interphase. In *Saccharomyces cerevisiae*, the transmembrane proteins Brl1 and Brr6 are essential for this fusion process. However, their exact molecular mechanisms remain unclear.

In this study, we use computational approaches—coarse-grained molecular dynamics (MD) simulations and structural modeling—to investigate Brl1 and Brr6 functions. AlphaFold2 predictions and MD simulations indicate they form multimeric ring structures with varying stoichiometries. Simulations in lipid bilayers suggest these proteins induce localized membrane curvature, possibly lowering the energy barrier for membrane fusion. We also explore how Brl1 and Brr6 may interact across opposing membranes to promote fusion, offering insight into early NPC assembly.