

P022 Nitrate and nitrite transport in *Escherichia coli*
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In the absence of oxygen, *Escherichia coli* can use nitrate or nitrite as terminal electron acceptors for anaerobic respiration. Two polytopic membrane proteins with twelve membrane-spanning helices, NarK and NarU are involved in nitrate and nitrite uptake and nitrite extrusion. A third polytopic membrane protein with six helices, NirC, functions only in nitrite transport. By measuring nitrate and nitrite transport abilities of strains expressing all combinations of *narK* and *nirC*, we hypothesised that the nitrate reductase, NRA is attached to the nitrate transporter NarK. This structure allows nitrate to be reduced to nitrite as rapidly as it is transported into the cell and also allows nitrite to be expelled from the cytoplasm as rapidly as it is formed. Aligning the protein sequences of a number of members of the nitrate transporter family revealed two highly conserved positively charged residues, corresponding to R87 and R303 of NarU, suggesting that these two residues play a key role in anion transport. The transport abilities of the NarU mutant at the two residues were consistent with this hypothesis. This result also indicates that NarU might form a single channel for nitrate and nitrite transport, although there is a significant sequence similarity between the first and second six helices of NarU.