

The structure of the ABC transporter PsaBC shows that bacterial manganese import is achieved by unique architectural features that are conserved across the kingdoms of life.

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Metal ions are essential for all forms of life. In prokaryotes, ATP-binding cassette (ABC) permeases serve as the primary import pathway for many micronutrients including the first-row transition metal manganese. However, the structural features of ionic metal transporting ABC permeases have remained undefined. This presentation will describe the crystal structure of the manganese transporter PsaBC from *Streptococcus pneumoniae* in an open-inward conformation. The Type II transporter has a tightly closed transmembrane channel due to 'extracellular gating' residues that prevent water permeation or ion reflux. Below these residues, the channel contains a hitherto unreported metal coordination site, which is essential for manganese translocation. These structural features are highly conserved in metal-specific ABC transporters and are represented throughout the kingdoms of life. Collectively, our results define the structure of PsaBC and reveal the features required for divalent cation transport.

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