

Porphyrin

Porphyrins are a group of heterocyclic macrocycle organic compounds, composed of four modified pyrrole subunits interconnected at their α carbon atoms via methine bridges ($=CH-$). The parent porphyrin is porphin, and substituted porphines are called porphyrins. The porphyrin macrocycle has 26 (delocalized) pi electrons in total, therefore by Hückel's rule it is aromatic, possessing $4n+2$ π electrons ($n=4$, for the shortest cyclic path). Thus porphyrin macrocycles are highly conjugated systems and consequently they typically have very intense absorption bands in the visible region and may be deeply colored; the name "porphyrin" comes from the Greek word porphyros, meaning purple.[

Many porphyrins are naturally occurring; one of the best-known porphyrins is heme, the pigment in red blood cells, a cofactor of the protein hemoglobin. (The specific porphyrin in heme B is called [protoporphyrin IX](#) and has 4 methyl, two vinyl, and two propionic acid substituents at the indicated positions.)

[5-aminolevulinic acid](#) (5-ALA) [fluorescence](#)-guided [resection](#) is a technique used in [neurosurgery](#), particularly for brain [tumor resection](#), including metastases. This method involves the administration of 5-ALA to the patient before surgery, which is then metabolized by the tumor cells to produce fluorescent [porphyrins](#). The fluorescence emitted by these porphyrins can be visualized using special surgical microscopes equipped with a blue light source, allowing neurosurgeons to distinguish between normal and cancerous tissue during the operation.

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