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Is it worth expending energy to convert biliverdin into bilirubin?

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Abstract

Bilirubin (BR) is generated by the reduction of biliverdin (BV), a metabolite that results from the catalytic degradation of heme by the isoforms of heme oxygenase (HO). BV is nontoxic and water-soluble but BR is potentially toxic and lipophilic. Therefore, a further metabolic step is required for BR before excretion is possible. The reductive conversion of BV to BR costs energy and is evolutionarily conserved in human physiology. There must be a compelling reason for this apparently nonsensical evolutionary conservation. In addition to the differences between BR and BV—such as water solubility, antioxidant activity, and participation as a receptor ligand—in the present study, we focused on the chemistry of the two metabolites with regard to an electrophilic functional group called a Michael reaction

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