

In situ* Assessment of Porphyrin Photosensitizers in *Propionibacterium acnes

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Porphyrins are known to be efficient photosensitizer molecules and the combined action of light and porphyrins in *Propionibacterium acnes* have a lethal action on the cells. Identification and quantification of *in situ* porphyrins in *P. acnes* have been done using an integrating sphere connected to an ordinary absorption spectrophotometer, and the amounts of porphyrins in the cells were quantified by measuring scattering free absorption spectra of the cell suspensions. The concentration of porphyrins in *P. acnes* cells were increased in either of two ways; by the addition of δ -aminolevulinic acid (ALA), which lead to the formation of coproporphyrin III under the incubation conditions used in these experiments, or by the addition of protoporphyrin IX (PPIX) to the cell suspension. In the latter case, PPIX molecules are taken up by the cells in a membrane-mediated uptake mechanism, and accumulate in the cells either on a monomeric or a particular aggregate form. The fraction of porphyrins on aggregate form increased with increasing PPIX additions. In the case of ALA induced porphyrin production, only monomeric porphyrins were stored in the cells. In both cases, the cells have a limited binding capacity of monomeric porphyrins, which is estimated to be 3×10^5 molecules/cell, or one porphyrin molecule to every 100th lipid molecule in the cell membrane.

Key words: *Propionibacterium acnes*, Porphyrins, Absorption Spectra