

抗マラリア薬キニーネの光励起三重項状態と一重項酸素光増感生成抑制

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Photoexcited Triplet State of Quinine, an Antimalarial Drug, and Suppression of Quinine-Photosensitized Singlet Oxygen Generation (*Graduate School of Engineering Science, Yokohama National University*) ○Yuta Suzuki, Mikio Yagi, Azusa Kikuchi

Quinine is one of the best known alkaloids, for its antimalarial activity. It binds to melanin and accumulates in melanin-rich areas of the body (eye, skin, hair). These tissues are frequently exposed to solar radiation and artificial light. Energy transfer from photoexcited triplet state of quinine to ground-state oxygen generates singlet oxygen which can play deleterious role in biological systems. In the present study, the excited triplet state of quinine has been studied through the measurements of transient absorption, phosphorescence and EPR. The suppression of quinine-photosensitized singlet oxygen generation has been studied through the measurements of time-resolved near-IR phosphorescence. The photoexcited triplet state of 6-methoxyquinoline, a closely related component, has been studied for comparison.

Keywords : Quinine; Singlet Oxygen; Phosphorescence; ESR; Triplet State

抗マラリア薬のキニーネはメラニンと結合しやすく、眼や皮膚などの光に曝される部位に集積される¹⁾。紫外線を吸収したキニーネは励起三重項状態から基底状態の酸素分子にエネルギーを移動し、酸化力の強い一重項酸素を生成する²⁾。本研究では過渡吸収、りん光および ESR 測定を行い、キニーネの励起三重項状態の性格を明らかにした。さらに時間分解近赤外発光測定を行い、一重項酸素生成抑制法について検討した。キニーネ(QN)はキヌクリジン(QC, $pK_a = 11.4$)とキノリン(QL)から構成されている (Figure 1)。比較のために 6-メトキシキノリン (6-MeOQL, $pK_a = 5.2$) の励起三重項状態についても調べた。QN, QC および 6-MeOQL はそれぞれの pK_a 値に従って中性分子およびプロトン付加陽イオンとなる^{3,4)}。そのため、各種測定は pH を変化させて行った。

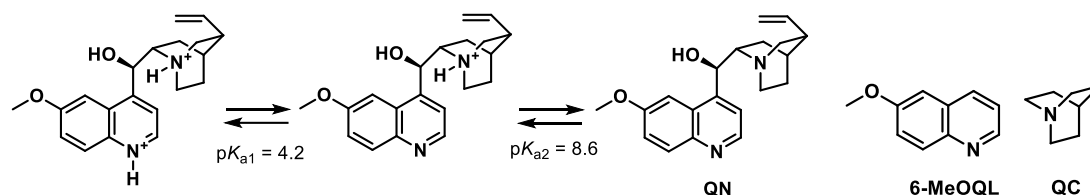


Figure 1. Molecular structures of QN, 6-MeOQL and QC.

- 1) S. Kristensen *et al.*, *J. Photochem. Photobiol. B* **1994**, 26, 87–95.
- 2) A. G. Morten *et al.*, *Photochem. Photobiol.* **1999**, 69, 282–287.
- 3) S. G. Schulman, R. M. Threatch, *J. Pharm. Sci.* **1974**, 63, 876–880.
- 4) E. A. Castro *et al.*, *J. Phys. Org. Chem.* **2008**, 21, 102–107.