

Singlet oxygen phosphorescence detection *in vivo* identifies PDT induced anoxia in solid tumors

Steffen Hackbarth^{a,*}, Waliul Islam^b, Jun Fang^c, Vladimír Šubr^d, Beate Röder^a, Tomáš Etrych^d, Hiroshi Maeda^e

^a Photobiophysics, Institute of Physics, Humboldt University of Berlin, Newtonstr. 15, 12489 Berlin, Germany

^b Department of Microbiology, Graduate School of Medical Sciences, Kumamoto University, Kumamoto 860-8556, Japan

^c Laboratory of Microbiology and Oncology, Faculty of Pharmaceutical Sciences, Sojo University, Kumamoto 860-0082, Japan

^d Institute of Macromolecular Chemistry, Czech Academy of Sciences, Heyrovského nám. 2, 16206 Prague, Czech Republic

^e BioDynamics Research Foundation, Kumamoto 862-0954, Japan

Supporting Information

Confirmation of coupling of PyF to the polymer backbone

The fluorescence anisotropy decay of PyF in ethanol is in the typical range of tetrapyrrols with 230 ± 30 ps. After coupling to pHPMA, the anisotropy decay is split into two components (Fig.S1), one caused by the remaining mobility of the attached chromophores, shortened by Förster energy transfer between molecules attached to one HPMA molecule (<100 ps), the second is determined by the motion of the pHPMA backbone (1.0 ± 0.3 ns). Based on this result, the coupling of PyF to pHPMA is confirmed.

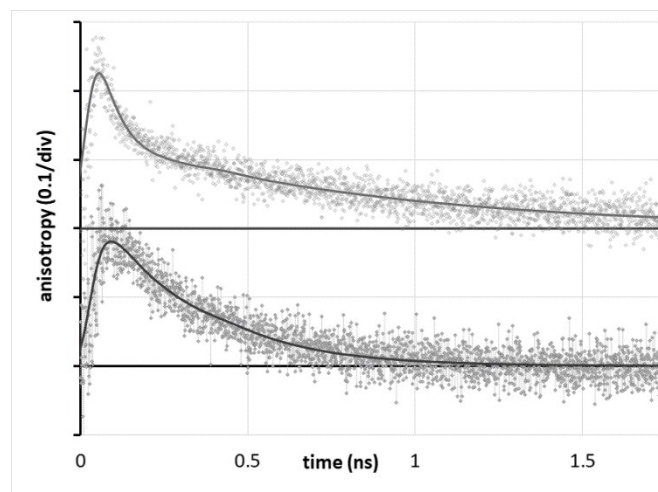


Figure S1: Fluorescence anisotropy of P-PyF compared to that of PyF (shown below), both measured in ethanol

Graphical explanation for the lower penetration depth of the excitation light due to extravasated drug:

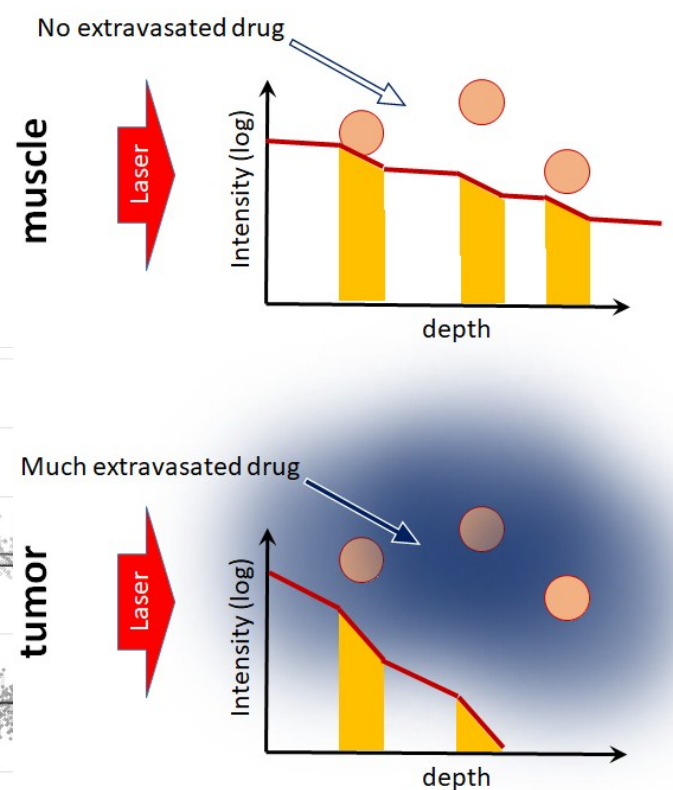


Figure S2: Due to additional absorption by the highly concentrated drug, extravasated in tumor tissue due to EPR effect, the penetration of light into the tissue is reduced. Schematic illustration - the yellow areas indicate the light, which reaches blood vessels at the corresponding depth.

Background signals from drug-free mice

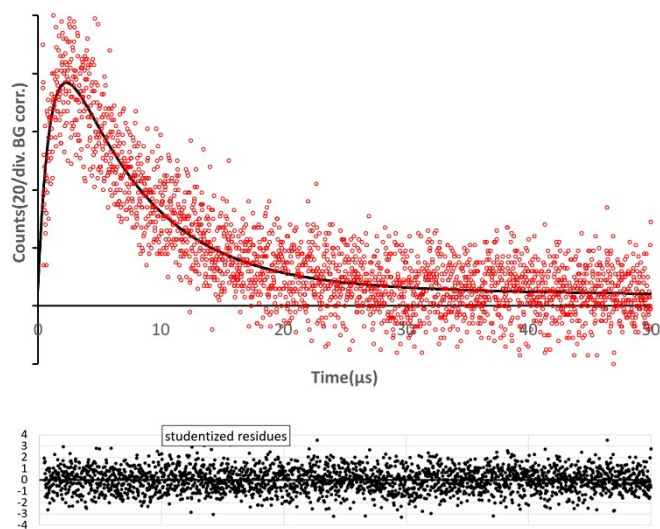


Figure S3: Typical corrected $^1\text{O}_2$ phosphorescence detected at various places of drug free mice.