

# 激光闪光光解研究二氟沙星对氨基酸和 dGMP 的光敏损伤

李海霞<sup>1,2</sup>, 刘艳成<sup>1,2</sup>, 唐睿智<sup>1,2</sup>, 曹西艳<sup>1,3</sup>, 付海英<sup>1</sup>, 姚思德<sup>1</sup>, 王文锋<sup>1,\*</sup>

<sup>1</sup>中国科学院上海应用物理研究所, 上海, 201800

<sup>2</sup>中国科学院研究生院, 北京, 10049

<sup>3</sup>湖南科技大学化学化工学院, 湘潭, 411201

\*Email: [wangwenfeng@sinap.ac.cn](mailto:wangwenfeng@sinap.ac.cn)

摘要: 氟喹诺酮类药物 (Fluoroquinolones, FQs) 是在医学临床与日常生活中有着广泛应用的一类广谱、高效的抗菌类药物。自上世纪90年代末, FQs 的光敏毒性引起了学者的关注, 很多学者对FQs 的光物理、光化学性质进行广泛而深入的研究, 经研究发现其发生概率与药物分子结构有关, 但是, 该类药物的光敏毒性机理目前并不清楚。为了更好地探究FQs 的光敏毒性机理, 本文利用时间分辨的激光闪光光解技术研究了新一代氟喹诺酮药物—二氟沙星(DFX) 对氨基酸和dGMP的光敏损伤。研究表明, 在水溶液体系中, 二氟沙星的激发三重态可以与色氨酸, 酪氨酸, 半胱氨酸和dGMP发生电子转移反应, 二氟沙星与色氨酸, 酪氨酸, 半胱氨酸和dGMP的电子转移反应的速率分别为 $1.97 \times 10^8$ ,  $1.48 \times 10^8$ ,  $1.72 \times 10^8$ , and  $6.92 \times 10^7 \text{ dm}^3 \text{ mol}^{-1} \text{ s}^{-1}$ 。

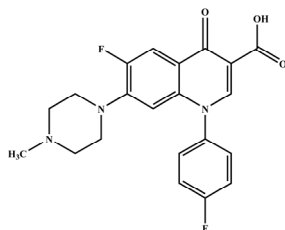


Fig 1 Structure of DFX

关键词: 二氟沙星; 氨基酸; dGMP; 激光闪光光解

参考文献

[1] Zhang, P.; Song, XY.; Li, HX.; Yao, SD.; Wang, WF. *J.Photochem.Photobi A: Chemistry*, **2010**,**215**:191.

## Reactions of triplet state difloxacin with amino acids and dGMP: a laser flash photolysis study

**Haixia Li<sup>1,2</sup>, Yancheng Liu<sup>1,2</sup>, Ruizhi Tang<sup>1,2</sup>, Side Yao<sup>1</sup>, Wenfeng Wang<sup>1,\*</sup>**

<sup>1</sup> Shanghai Institute of Applied Physics, Chinese Academy of Sciences, Shanghai, 201800

<sup>2</sup> Graduate University of Chinese Academy of Science, Beijing, 100049

<sup>3</sup> School of Chemistry and Chemical Engineering of Hunan University of Science and Technology, Xiangtan 411201,

Abstract: Laser flash photolysis was used to study the reactions of triplet difloxacin (DFX) with various amino acids and 2'-deoxyguanosine-5'-monophosphate (dGMP) in aqueous media. Tryptophan (TrpH), tyrosine (Tyr), cysteine (Cys) and (dGMP) were found to complete in quenching the triplet state of DFX in aqueous solution, with second-order rate constants of  $1.97 \times 10^8$ ,  $1.48 \times 10^8$ ,  $1.72 \times 10^8$ , and  $6.92 \times 10^7 \text{ dm}^3 \text{ mol}^{-1} \text{ s}^{-1}$ , respectively. TrpH, Tyr, Cys and dGMP react with the photo-excited triplet state of DFX by electron transfer from TrpH, Tyr, Cys, and dGMP moieties generating DFX anion radical absorption.