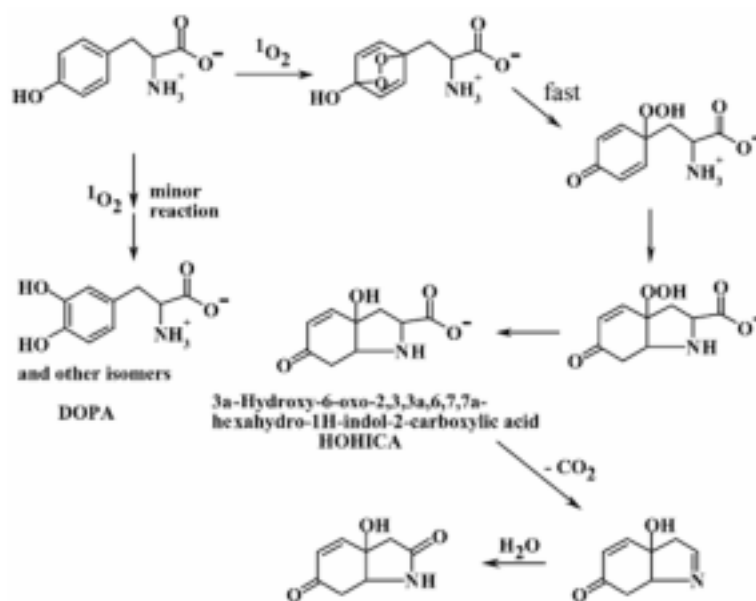


单线态氧引起的蛋白质损伤研究

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在光敏剂参与下,生物组织经特定波长光辐照后产生的损伤或死亡称为光敏反应或光动力反应。光敏剂的激发态与基态氧发生激发能转移或电子转移产生单线态氧($^1\text{O}_2$)和超氧阴离子自由基($\text{O}_2^{\cdot-}$)。 $^1\text{O}_2$ 是一种反应活性相当高的亲电瞬态中间体,能高效地氧化生物大分子,造成生物体的损伤。蛋白质分子是单线态氧氧化的主要靶分子之一^[1,2]。蛋白质中主要的发色基团有色氨酸、酪氨酸、苯丙氨酸、组氨酸、半胱氨酸、胱氨酸等,它们与单线态氧的反应受到普遍关注,以酪氨酸为例简要介绍如下^[2,3]:



研究表明单线态氧主要与蛋白质中的 Trp、Met、Cys、His、Tyr 等残基发生反应,形成短寿命的内生过氧化物或氢过氧化物。我们从微观、动态和分子反应的角度研究活性氧自由基对蛋白质、肽及氨基酸进行损伤的反应机理和动力学过程,探讨在活性氧自由基的参与下蛋白质、肽及氨基酸损伤过程中发生的电荷转移或氢原子转移机制,为更好地理解退行性疾病中的自由基机理作用提供理论参考。

关键词 活性氧自由基,单线态氧,光敏剂

中图分类号 O644.12

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The damage of proteins caused by singlet oxygen

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Organisms produces reactive oxygen species (ROS) throughout their lives. ROS including superoxide anions, hydroxyl radicals, hydrogen peroxide and singlet oxygen whit known to oxidize biological macromolecules, The accumulation of oxidized, or modified, extra- and intra-cellular proteins *in vivo* cause age-related diseases such as Parkinson's disease and cataract. Therefore, it is important to study the damage of proteins by photo-sensitizer. Singlet oxygen is a high reactive oxidant in biology systems, and that proteins are a major target for the damage initiated by this reactive species. Reaction with proteins occurs primarily at Trp, Met, Cys, His, and Tyr side-chains with this resulting in the formation of short-lived endo- or hydroperoxides on Trp, His, and Tyr residues. This paper is a brief introduction about the reactions of singlet oxygen with tyrosine and histidine.

KEYWORDS Reactive oxygen species, Singlet oxygen, Photo-sensitizer

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