上海市生物化学与分子生物学学会

2019 年青年学术论坛

优秀青年报告 推荐表

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报告题目	**A vitamin-C-derived DNA modification catalysed by an algal TET homologue**		
报告摘要	Methylation of cytosine to 5-methylcytosine (5mC) is a prevalent DNA modification found in many organisms. Sequential oxidation of 5mC by TET dioxygenases results in a cascade of additional epigenetic marks and promotes DNA demethylation in mammals. However, the enzymatic activity and the function of TET homologs in diverse eukaryotes remains largely unexplored. In our study of TET homologs in the green alga Chlamydomonas reinhardtii, we have found a 5mC-modifying enzyme (CMD1) that catalyzes conjugation of a glyceryl moiety to the methyl group of 5mC through a carbon-carbon bond, resulting in two novel stereoisomeric nucleobase products. The catalytic activity of CMD1 requires Fe(II) and the integrity of its binding motif His-x-Asp (HxD), which is conserved in Fe-dependent dioxygenases. However, unlike all previous described TET enzymes which utilize 2-oxoglutarate (2-OG) as a co-substrate, CMD1 utilizes L-ascorbic acid (vitamin C, VC) as an essential co-substrate. VC donates the glyceryl moiety to 5mC with concurrent formation of glyoxylic acid and CO2. The VC-derived DNA modification is present in the genome of C. reinhardtii and its level decreases significantly in a CMD1 mutant strain. The fitness of CMD1 mutant cells during high light exposure is reduced. LHCSR3, a critical gene for protection of C. reinhardtii from photooxidative damage in high light, is hypermethylated and downregulated compared to wild-type cells, causing a lowered capacity for photoprotective non-photochemical quenching (NPQ). Our study thus reveals a new eukaryotic DNA base modification, which is catalyzed by a divergent TET homolog and unexpectedly derived from VC, and its role as a potential epigenetic mark that may counteract DNA methylation in the regulation of photosynthesis.		
论文发表情况（近三年）	1. Xue et al. A vitamin-C-derived DNA modification catalysed by an algal TET homologue Nature 569, 581-585, (2019) 2. Xue et al. Uracil-DNA Glycosylase UNG Promotes Tet-mediated DNA Demethylation J. Biol. Chem. 2016, 291:731-738.		

请在 **2019 年 8 月 29 日**之前提交推荐表至学会办公室 ssbmb@sibs.ac.cn。

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