

动物科学

## 解偶联蛋白与动物的能量代谢<sup>\*</sup>

刘丽<sup>1</sup>, 田建云<sup>2</sup>, 李琦华<sup>1</sup>, 贾俊静<sup>1\*\*</sup>, 余红心<sup>1</sup>, Mark Jois<sup>3</sup>, Graham H McDowell<sup>3</sup>

(1. 云南农业大学, 云南省动物营养与饲料重点实验室, 云南 昆明 650201;

2. 德宏州潞西市畜牧局兽医工作站, 云南 潞西 678400;

3. 澳大利亚拉筹伯大学, 维多利亚 墨尔本 3086)

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**摘要** 动物需要能量来维持生命活动, 所需的能量主要来源于食物里的碳水化合物、脂肪和蛋白质。即使在体重平衡(非生产、生长状态)动物仍需要能量来维持体重、体温恒定及肌肉的基本活动。最新发现的线粒体内膜转运蛋白质, 具有调节能量代谢的作用, 它们的活动增加了动物的基础代谢率, 这类蛋白质被称为解偶联蛋白

(Uncoupling Proteins, UCPs)。UCPs作为质子通道驱散氧化呼吸时形成的H<sup>+</sup>梯度, 降低了线粒体膜电位差 $\Delta\mu\text{H}^+$ , 从而增加呼吸产热, 阻止ATP的形成。目前已至少发现有5种UCPs(UCP1, UCP2, UCP3, UCP4 和UCP5), 这个家族的蛋白质已经在人类、哺乳动物、禽类、鱼、真菌、甚至在植物不同组织的线粒体内膜上被发现。

**关键词** [解偶联蛋白](#) [能量代谢](#) [基础代谢率](#) [氧化磷酸化作用](#)

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## Uncoupling Proteins and Energy Metabolism in Animals

LIU Li<sup>1</sup>, TIAN Jian-yun<sup>2</sup>, LI Qi-hua<sup>1</sup>, JIA Jun-jing<sup>1</sup>, YU Hong-xin<sup>1</sup>, Mark Jois<sup>3</sup>,  
Graham H McDowell<sup>3</sup>

(1. Animal Nutrition and Feed Laboratory of Yunnan Province, Y A U, Kunming  
650201, China;

2. Institute of Veterinary of Luxi, Dehong Prefecture of Yunnan Province, Luxi  
678400, China;

3. La Trobe University, Australia, Vic 3086)

### Abstract

Animals require energy to support requirements for maintenances life activity. The animal derives energy by partial or complete oxidation of carbohydrates, fats and proteins ingested. Even in non-productive states, animals need energy for sustaining the body, keeping a stable body temperature, and for maintaining muscular activity. Located in the inner membrane of mitochondria, uncoupling proteins (UCPs) form a family of mitochondrial anion transporters affect energy metabolism and their activity increase basal metabolic rate because UCPs can act as leaks in mitochondrial inner membranes allowing protons to leak into the matrix thus dissipating the proton gradient during electron transport chain, uncoupling respiration from ATP production and allowing the dissipating of heat<sup>[1,2]</sup>. Up to now, there have been identified five UCPs (UCP1, UCP2, UCP3, UCP4 and UCP5) family members in inner membrane of mitochondria including in human, mammals, birds, fish, fungi and even in plants.

**Key words** [uncoupling proteins](#) [energy metabolism](#) [basal metabolic rate](#)  
[oxidative phosphorylation](#)

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通讯作者 贾俊静

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