2020 Literature report I

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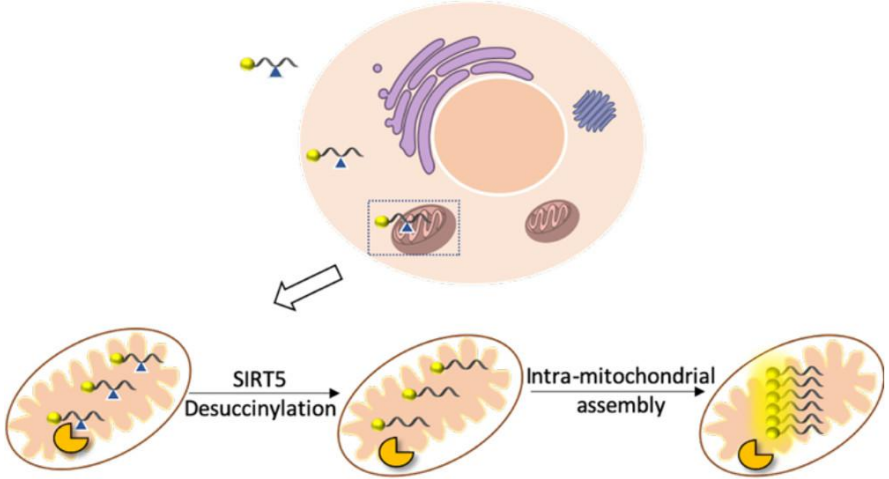
Article

Desuccinylation-Triggered Peptide Self-Assembly: Live Cell Imaging of SIRT5 Activity and Mitochondrial Activity Modulation

Liu Yang,◊ Raoul Peltier,◊ Manman Zhang,◊ Dan Song, Hui Huang, Ganchao Chen, Ying Chen, Fanghang Zhou, Quan Hao, Liming Bian, Ming-liang He,* Zuankai Wang,* Yi Hu,* and Hongyan Sun*



JACS 2020 18150

Author

Dr. SUN Hongyan

Research topics：

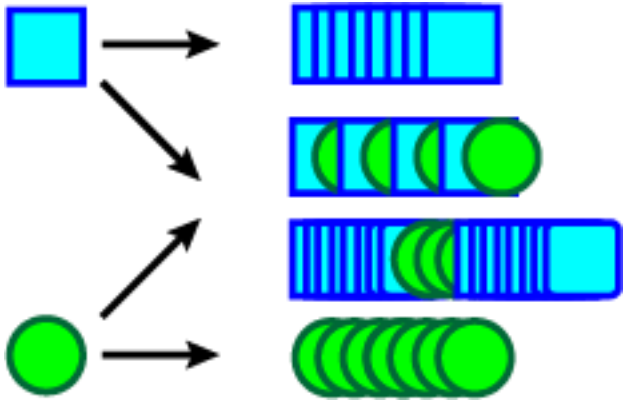
1. Developing microarray-based screening platform.

2. Developing novel fluorescent probes for live cell imaging studies.

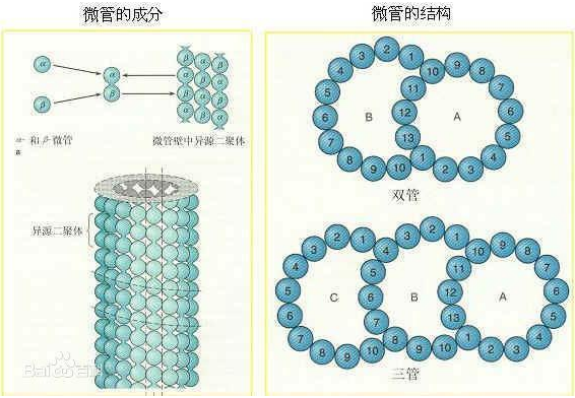
3. Developing novel biomaterials for biological application.

Introduction

超分子自组装(Supramolecular assembly)的定义是由非共价键组合成的多分子集团



氢键、π−π堆叠、偶极−偶极吸引、范德华力、疏水作用、静电相互作用和金属配体配位



自组装示意图

细胞微管

Introduction

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Enzyme-Instructed Self-Assembly of Small D-Peptides as a Multiple-Step Process for Selectively Killing Cancer Cells

Jie Zhou, Xuewen Du, Natsuko Yamagata, and Bing Xu*

- 缺少利用具有特定定位的酶实现亚细胞靶向的工作

JACS 2016 3813

Introduction

Table 1 | **Sirtuin localization and function**

Sirtuin	Class	Localization	Activity	Targets	Refs
SIRT1	I	Nucleus, cytosol	Deacetylation	PGC1α, FOXO1, FOXO3, p53, Notch, NF-κB, HIF1α, LXR, FXR, SREBP1c and more	5,30,32, 33,39, 41,42
SIRT2	I	Cytosol	Deacetylation	Tubulin, PEPCK, FOXO1, PAR3	58–61
SIRT3	I	Mitochondria	Deacetylation	LCAD, HMGCS2, GDH, OXPHOS complexes, SOD2, IDH2 and more	46–49, 51–57
SIRT4	II	Mitochondria	ADP-ribosylation	GDH	17
SIRT5	III	Mitochondria	Deacetylation, demalonylation, desuccinylation	CPS1	21–23
SIRT6	IV	Nucleus	Deacetylation, ADP-ribosylation	H3K9, H3K56	14,18–20, 63
SIRT7	IV	Nucleolus	Unknown	Unknown	15,64

Nat. Rev. Mol. Cell Biol. 2012 225

Introduction

nature COMMUNICATIONS

ARTICLE

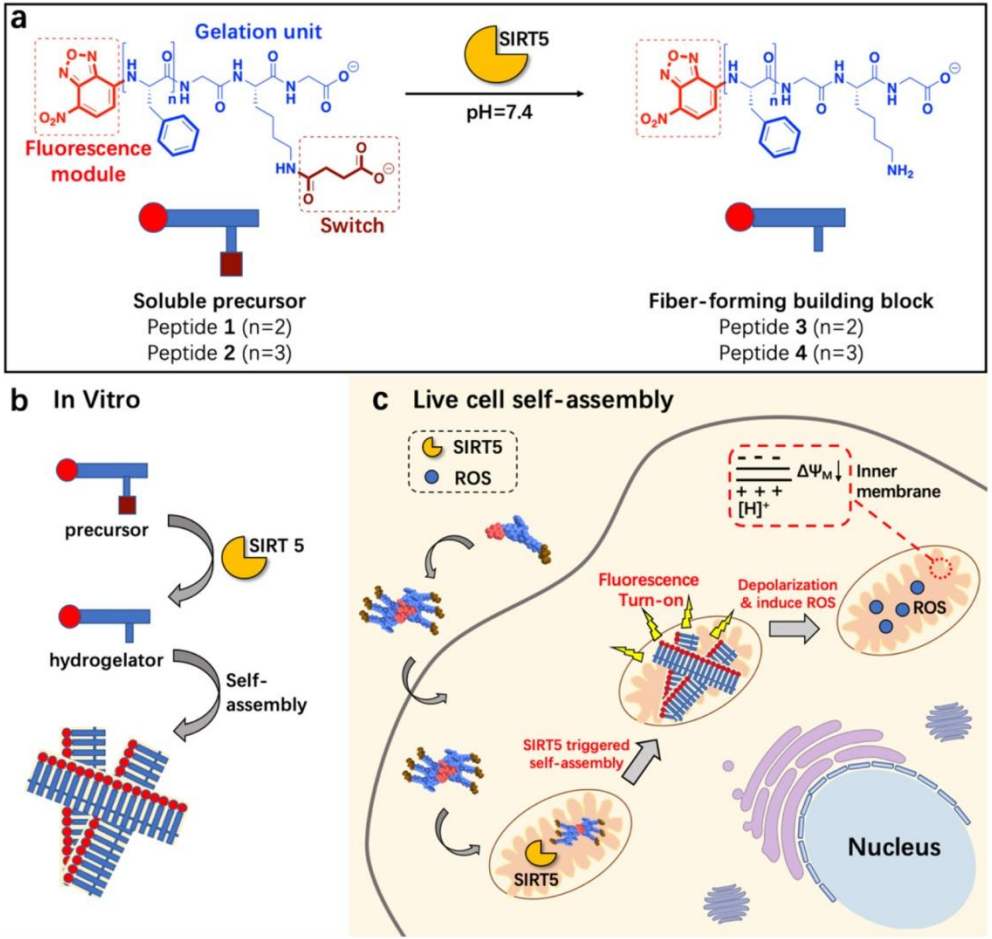
DOI: 10.1038/s41467-018-02951-4 OPEN

Sirtuin5 contributes to colorectal carcinogenesis by enhancing glutaminolysis in a deglutarylation-dependent manner

Yun-Qian Wang[1,2,3], Hao-Lian Wang[1,2,3], Jie Xu[1,2,3], Juan Tan[1,2,3], Lin-Na Fu[1,2,3], Ji-Lin Wang[1,2,3], Tian-Hui Zou[1,2,3], Dan-Feng Sun[1,2,3], Qin-Yan Gao[1,2,3], Ying-Xuan Chen[1,2,3] & Jing-Yuan Fang[1,2,3]

Nat. Commun. 2018 545

Design and principle



Characterization

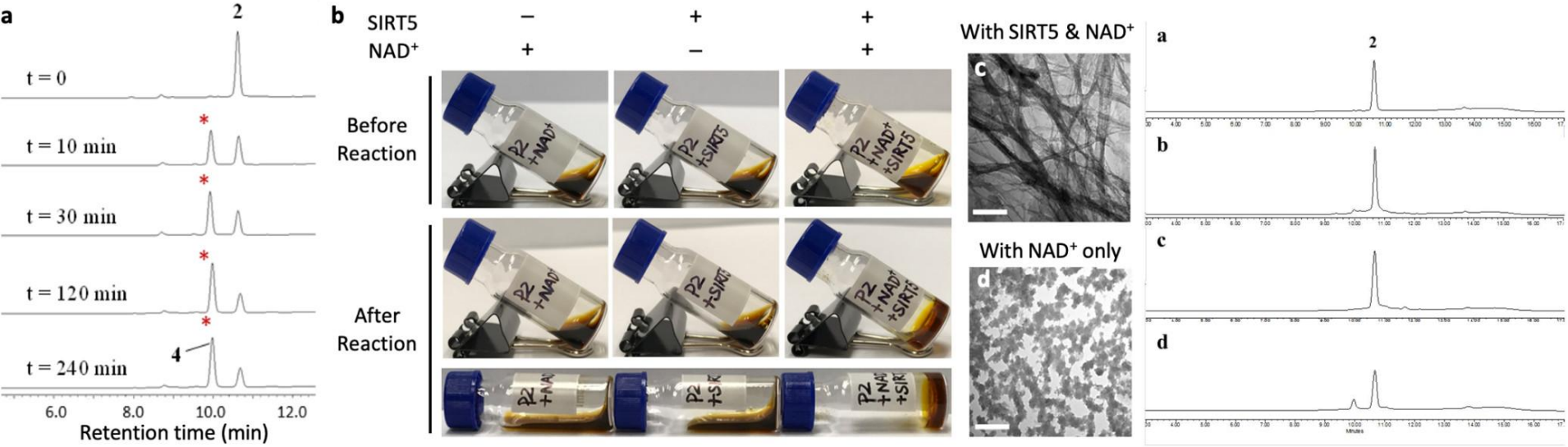
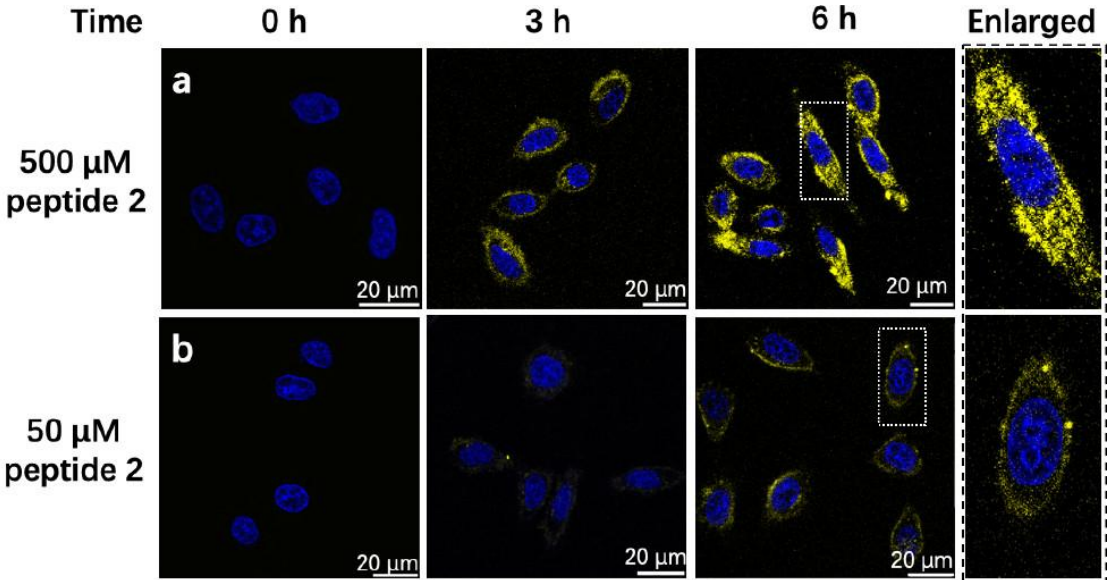


Fig. S3

Characterization



Characterization

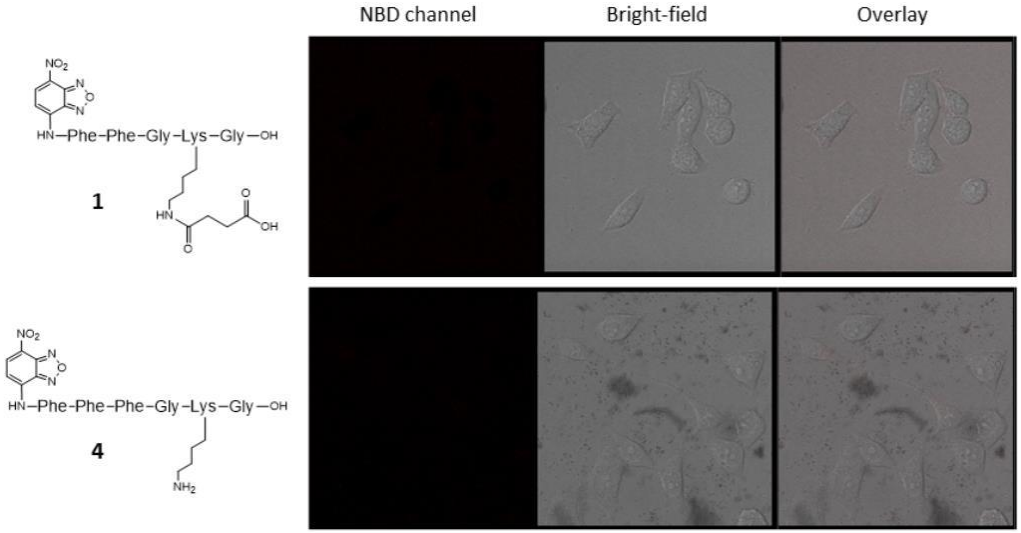


Fig. S11

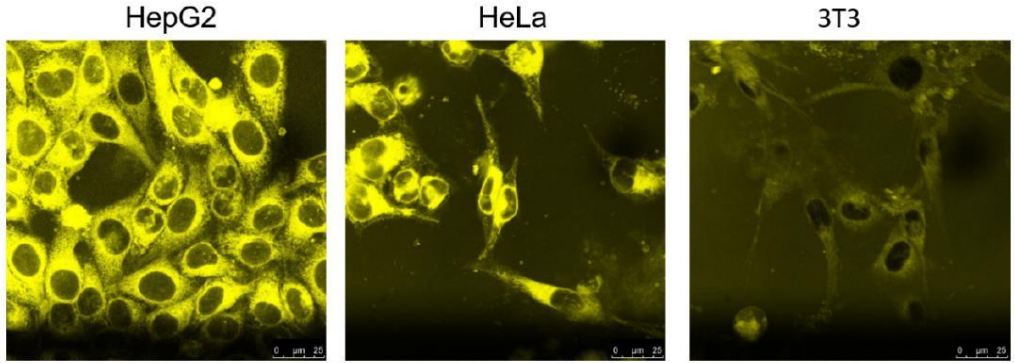
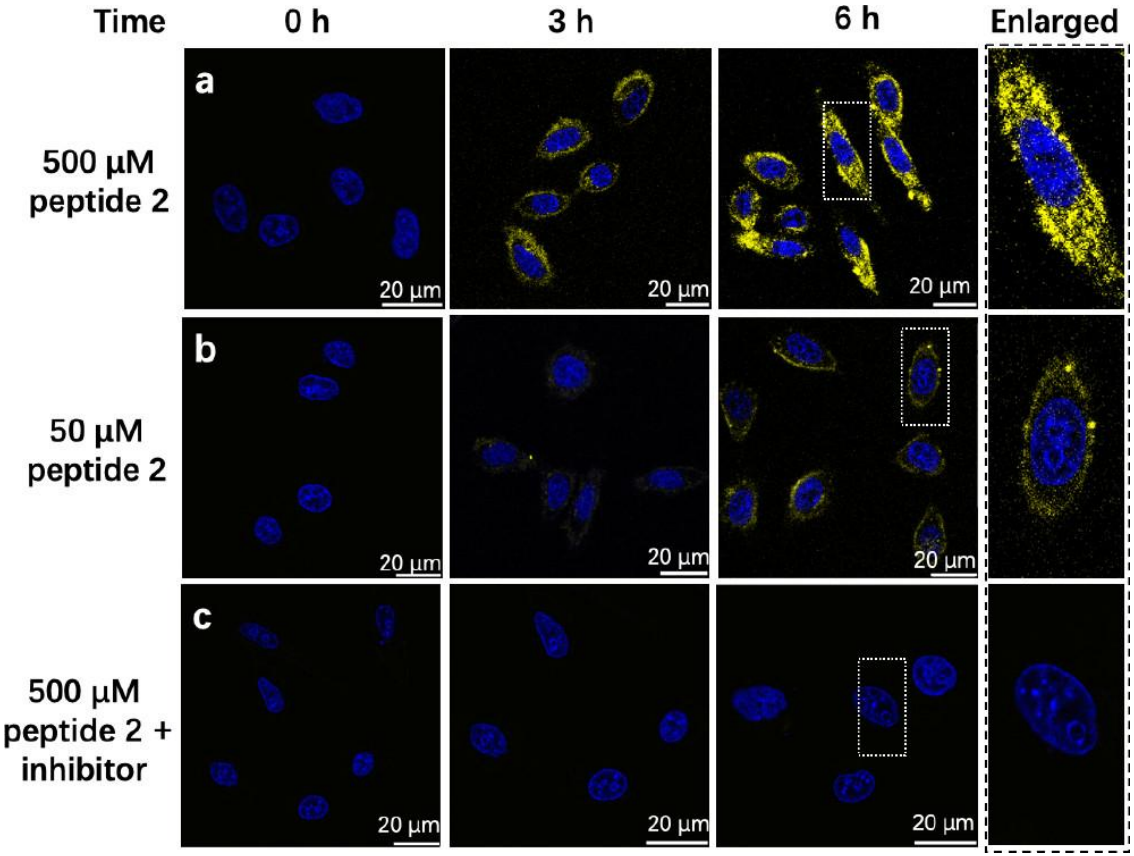
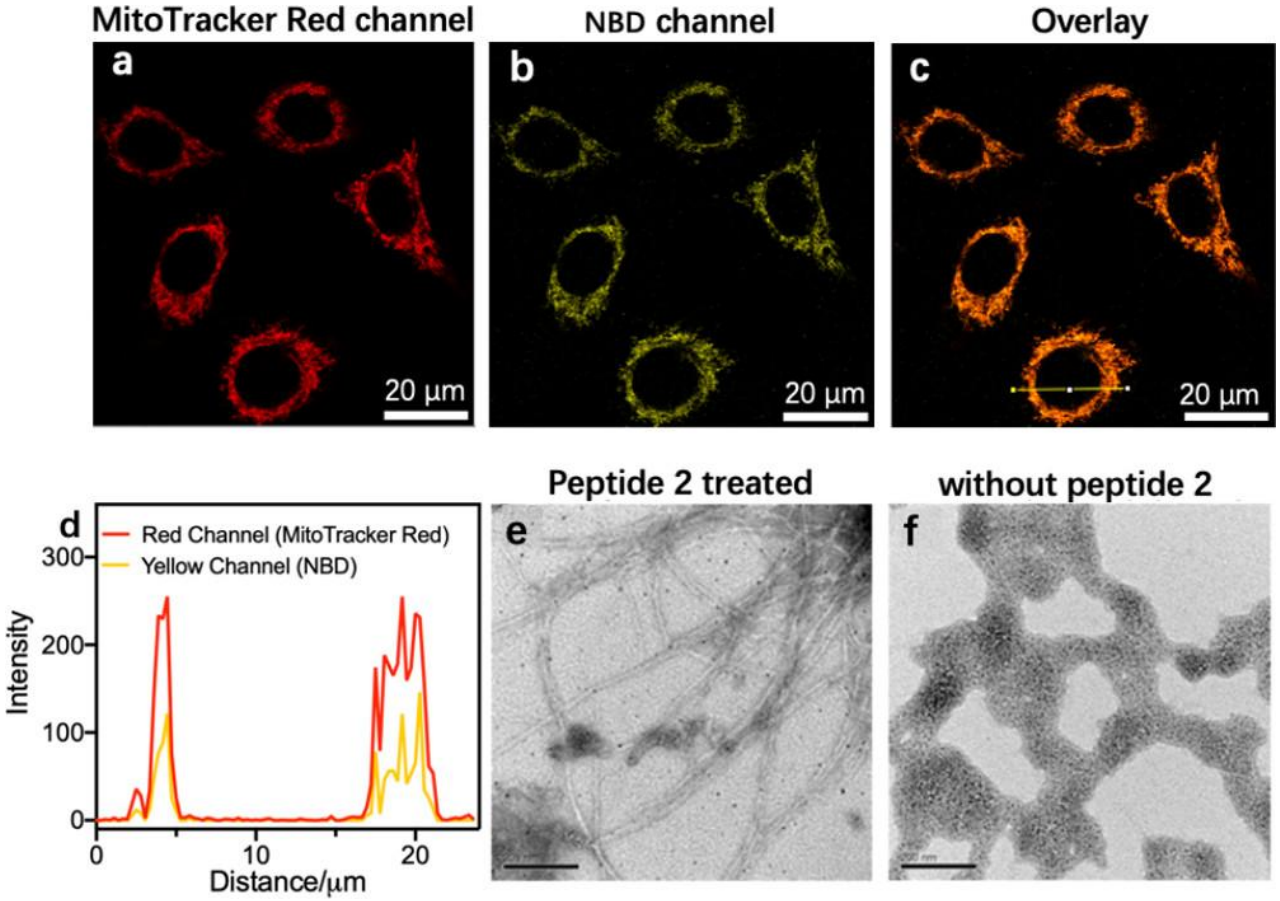


Fig. S12

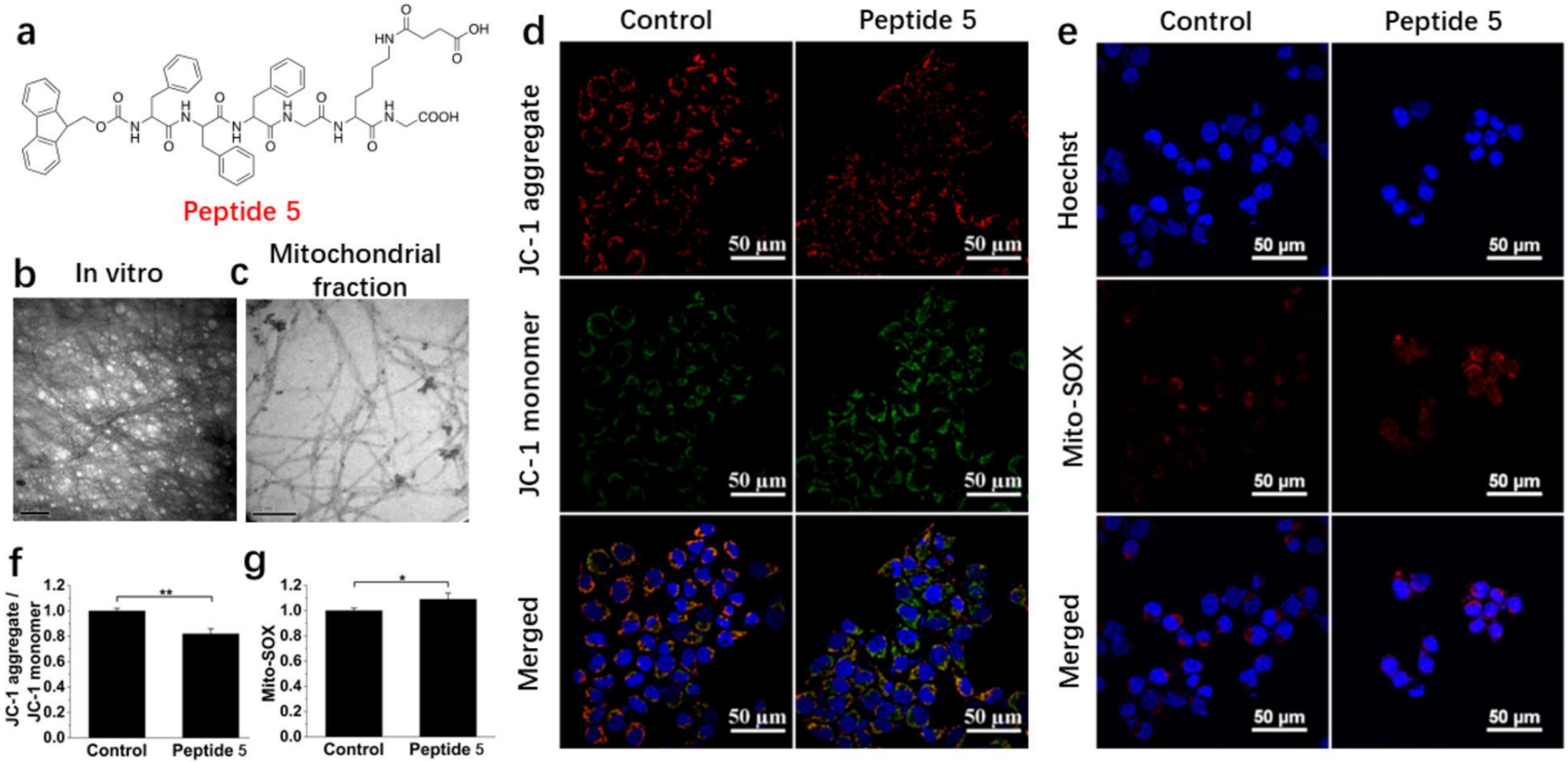
Characterization



Characterization



Live cell imaging

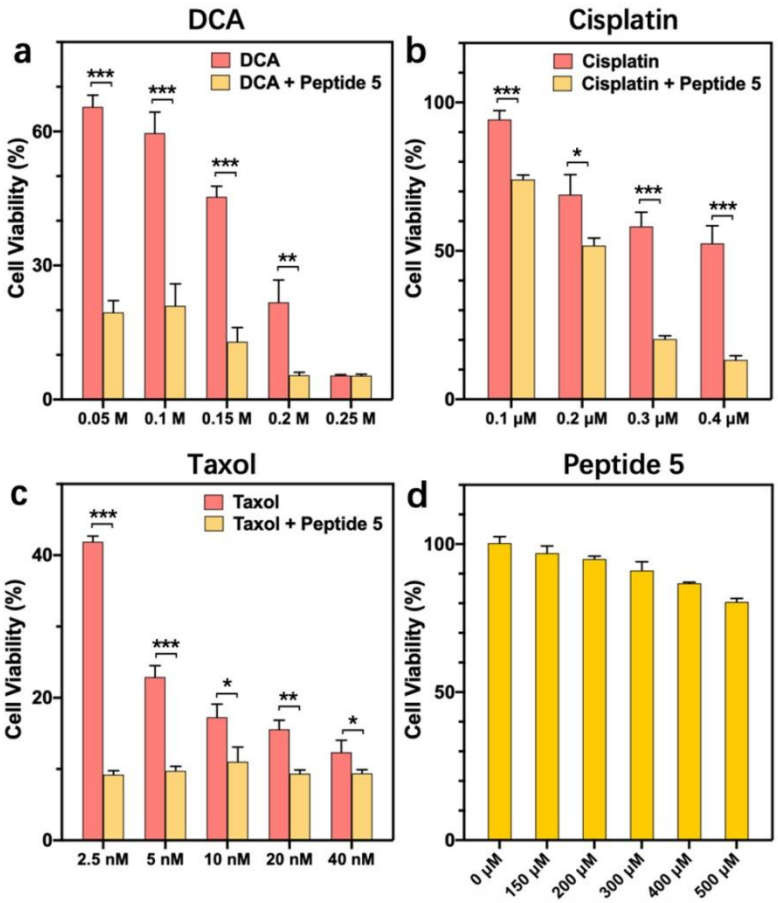


Application

- 二氯乙酸盐(DCA)
  丙酮酸脱氢酶激酶抑制剂

- 顺铂(Cisplatin)
  干扰DNA转录

- 紫杉醇(Taxol)
  与微管蛋白结合，干扰细胞有丝分裂，诱导细胞凋亡



Summary

- 通过去琥珀酸化反应特异性识别线粒体内的SIRT5蛋白，提出了一种新的在线粒体内的进行超分子自组装的策略

- 通过细胞外和细胞内实验证明了分子的自组装能力和线粒体定位能力

- 通过对线粒体膜电位和ROS监控证明了该分子的自组装行为可以调节线粒体活性

- 通过药物实验证明了该分子自组装具有与抗癌药物协同提高对癌细胞杀伤力的能力