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汪东昇 郑斯莉 程明和 缪朝玉（ 200433）

［摘要］ 目的 NMN LPS 方法 10 C57BL/6J LPS 10 mg/kg NMN 3 0.5 h 10 30 100 300 mg/kg 0.5 h 30 100 300 600 mg/kg 0.5 h 12 h 300 mg/kg 结果 0.5 h 0.5 h NMN 0.5 h 12 h NMN NMN 结论 NMN LPS NMN

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Effect of nicotinamide mononucleotide on mortality of mice with endotoxic shock

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［**Abstract**］ **Objective** To study the effect of nicotinamide mononucleotide (NMN) on the mortality of the lipopolysaccharide (LPS)-induced endotoxic shock mouse model. **Methods** 10-week-old C57BL/6J male mice were randomly divided into groups, and were injected intraperitoneally (i.p.) with LPS (10 mg/kg) to induce endotoxic shock models. NMN was i.p. injected in three ways: (1) 0.5 h after modeling, doses of 10, 30, 100 and 300 mg/kg; (2) 0.5 h before modeling, doses of 30, 100, 300 and 600 mg/kg; or (3) 0.5 and 12 h after modeling, dose of 300 mg/kg each time. The death times of each group were recorded, and the survival curves were drawn. **Results** Compared with the solvent control group, NMN at different doses given 0.5 h after or before modeling didn't improve the survival rate or delay the death time of endotoxic shock mice; But when given at 0.5 and 12 h 300 mg/kg after modeling, NMN accelerated the death of mice and increased the mortality of mice. NMN products by two manufacturers showed similar effects. **Conclusion** NMN has no therapeutic effect on LPS-induced endotoxic shock, and repeated administration of NMN after endotoxic shock will increase the mortality.

［**Key words**］ nicotinamide mononucleotide lipopolysaccharide endotoxic shock mortality

NAD [2] “ ” NMN

[1]

NMN NAD NMN 7 d

NMN 1

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[3]

12 100 300 mg/kg NMN

[4]

5 d NMN

NMN

[5] [6-9]

NMN

[10]

6 h

[11]

[12]

LPS LPS G-

G- [13]

NMN

NMN LPS

NMN

1 材料与方法

1.1 药品、试剂与仪器

[NMN ≥95% −25

−15]

[NMN~ ≥95% 2 8

] LPS

Sigma BT25S [

]

1.2 实验动物

SPF 8 C57BL/6J (-

)

2

22 26

40% 70% 20 25 Pa

60 70 12 h 8:00

20:00

1.3 动物分组、模型制备与给药处理

C57BL/6J

LPS 10 mg/kg

NMN

5 0.5 h

10 30 100 300 mg/kg 0.5 h

30 100 300 600 mg/kg

0.5 h 12 h 300 mg/kg

0.5 h 12 h 2 NMN

300 mg/kg 0.5 h

NMN 300 mg/kg

1.4 统计方法

Log-rank

$P<0.05$

GraphPad Prism8

2 结果

2.1 LPS 造模后 0.5 h 单次给予 NMN 无明显治疗作用

1 LPS 0.5 h 300 mg/kg

NMN

$P=$

0.216 1 LPS 0.5 h 300 mg/kg

NMN

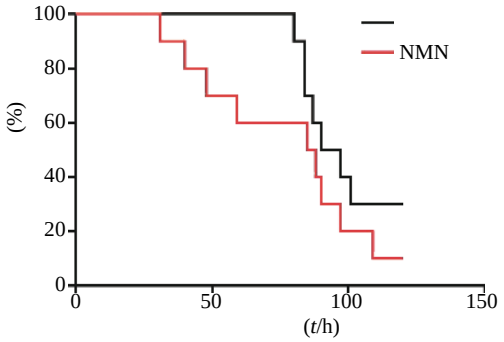

图 1 LPS 造模后 300 mg/kg NMN 单次给药对内毒素休克小鼠生存时间的影响（*n*=10）

LPS 0.5 h

NMN 2

10 30 100 300 mg/kg

NMN

300 100 30 10 mg/kg

51 55 41 38 h 37 h

NMN

100 mg/kg

P=0.433 4

LPS 0.5 h NMN

2.2 LPS 造模前 0.5 h 单次给予 NMN 无明显治疗作用

LPS 0.5 h NMN 3

300 mg/kg NMN

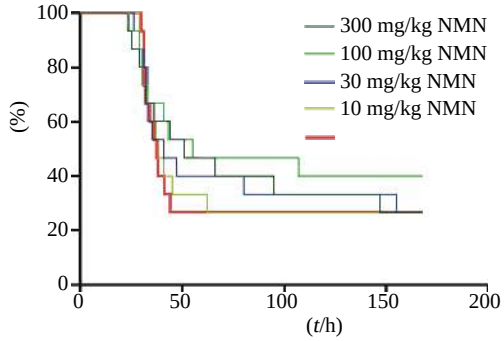

图 2　LPS 造模后不同剂量 NMN 单次给药对内毒素休克小鼠生存时间的影响（*n*=14）

2

83 h　　91 h

P=0.594 6　　LPS

0.5 h　　300 mg/kg NMN

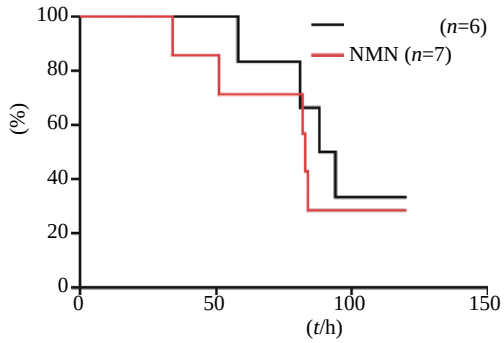

图 3　LPS 造模前 300 mg/kg NMN 单次给药对内毒素休克小鼠生存时间的影响

NMN

4　　NMN 30　100　300　600 mg/kg

NMN　　30 mg/kg　34 h　100 mg/kg　43 h　300 mg/kg　40 h　600 mg/kg　55 h　37 h

NMN　　LPS

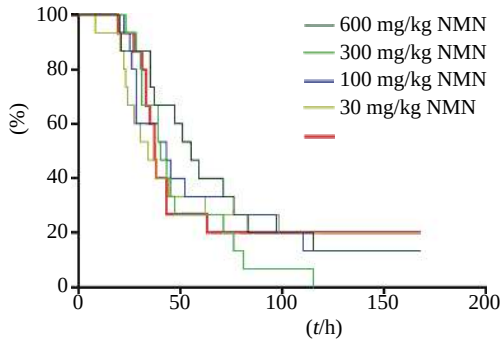

图 4　LPS 造模前不同剂量 NMN 单次给药对内毒素休克小鼠生存时间的影响（*n*=15）

2.3　LPS 造模后 0.5 h 和 12 h 两次给予 NMN 增加内毒素休克死亡率

NMN

NAD

NAD

NMN　2

5　2　　LPS

0.5 h　12 h　2　NMN　300 mg/kg

NMN

NMN

2

P=0.040 4　*P*=0.003 8

LPS　2　NMN

2.4　不同厂家 NMN 对 LPS 引起的内毒素休克的作用基本相同

NMN

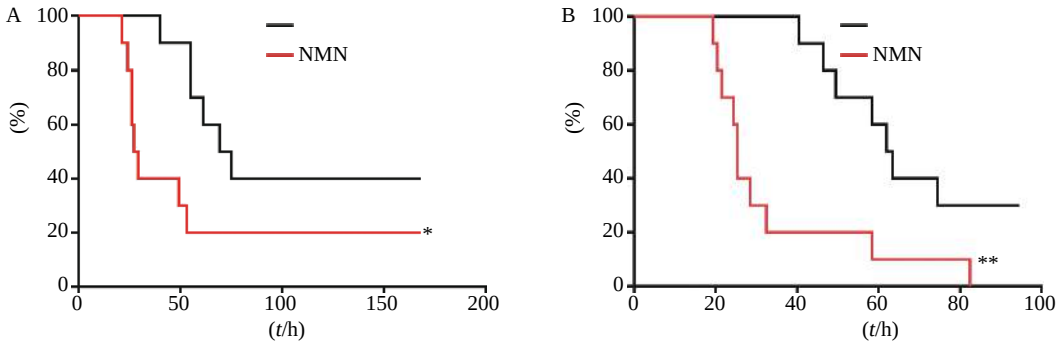

图 5　LPS 造模后两次 NMN 给药对内毒素休克小鼠生存时间的影响（*n*=10）

**P*<0.05　***P*<0.01

NMN
NMN NMN~
NMN
LPS 0.5 h 12 h 2
NMN 300 mg/kg
6 NMN
NMN~ 2

P=0.049 9 *P*=0.026 0
3 NMN 57.5 h
NMN~ 51.5 h 106.5 h
NMN 2
5 NMN
LPS 0.5 h 12 h 2
NMN 300 mg/kg

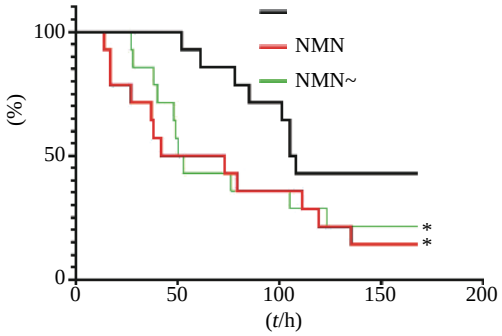

图 6 不同厂家 NMN 两次给药对内毒素休克小鼠生存时间的影响 (*n*=14)
**P*<0.05

NMN
LPS 0.5 h NMN NMN~
7 NMN NMN~
3
20%
71
NMN NMN~ 3
NMN 40 h NMN~
45 h 37 h NMN
LPS

P=0.644 7 *P*=
0.972 5 NMN
(3 4)

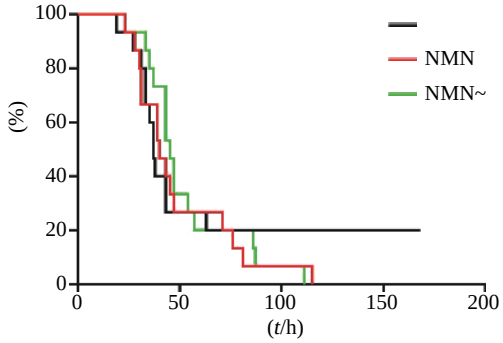

图 7 不同厂家 NMN 预防给药对内毒素休克小鼠生存时间的影响 (*n*=15)

3 讨论和总结

NMN

NMN[14] NMN

NMN

NMN
10 600 mg/kg[2, 4]
NMN
300 mg/kg
LPS 0.5 h 0.5 h
NMN
LPS NMN

NMN
LPS NMN

NMN

NMN

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