

生物化学工程与技术

## 葡萄糖浓度对杂交瘤细胞代谢通量分布的影响

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摘要

将代谢工程理论应用于动物细胞的流加培养过程。通过构建代谢网络模型, 研究了杂交瘤细胞从动态到拟稳态过程中物质和能量代谢通量的时间分布图。结果表明: 当葡萄糖浓度较高时, 葡萄糖在乳酸生成途径和TCA循环的代谢通量分配比例分别为90%和10%, ATP生成的比例分别为20%和60%, 说明葡萄糖大部分经糖酵解途径生成乳酸, 而进入TCA循环的少量部分则提供大部分的能量生成。当葡萄糖浓度降至其限制细胞生长的浓度时, 进入TCA循环的葡萄糖比例逐步提高到100%, 葡萄糖的氧化程度从 $0.6 \text{ mmol} \cdot \text{mmol}^{-1}$ 增至 $4.52 \text{ mmol} \cdot \text{mmol}^{-1}$ , 说明葡萄糖代谢逐渐从乳酸生成途径迁移到TCA循环, 从无氧代谢逐渐转移到有氧代谢。

关键词

[代谢通量分布](#) [杂交瘤细胞](#) [流加培养](#) [葡萄糖](#) [TCA循环](#)

分类号

## Effect of glucose concentration on metabolic flux distribution of hybridoma cells

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### Abstract

The theory of metabolic engineering was applied to a fed batch culture of animal cells. Through the construction of metabolic network model, the time distribution of mass and energy metabolic fluxes was studied for hybridoma cells from dynamic to pseudo-steady state. The distribution partition of mass metabolic flux of high-level glucose between lactate production pathway and tricarboxylic acid (TCA) cycle was 90% and 10%, with the ratio of ATP production 20% and 60%, respectively. When glucose concentration decreased below the growth-limiting extent, the percentage of glucose entering into TCA cycle was gradually increased to 100%, the oxidative extent of glucose was improved from  $0.6 \text{ mmol} \cdot \text{mmol}^{-1}$  to  $4.52 \text{ mmol} \cdot \text{mmol}^{-1}$ . It suggested that glucose metabolism was drifted from anaerobic lactate production pathway to aerobic TCA cycle.

### Key words

[metabolic flux distribution](#) [hybridoma cells](#) [fed batch culture](#) [glucose](#) [TCA cycle](#)

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