

论著

大鼠睁眼前初级视皮层2/3层锥体神经元突触自身稳态可塑性的变化特征

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摘要 目的: 通过对Wistar大鼠睁眼前初级视皮层2/3层锥体神经元突触AMPA (α -氨基-3-羧基-5-甲基异恶唑-4-丙酸) 介导的微小兴奋性突触后电流 (mEPSCs) 的测定分析, 研究突触自身稳态可塑性在生后早期初级视皮层的作用特点。方法: 采用红外可视膜片钳技术全细胞模式记录生后4-11(d) (P4-11) Wistar大鼠初级视皮层脑片2/3层锥体神经元AMPA介导的mEPSCs, 钳制电位-70 mV。人工脑脊液中加入河豚毒素 (TTX)、荷包牡丹碱 (BMI) 及2-氨基-5-磷酸基戊酸 (AP-5) 分离出AMPA介导的mEPSCs, 加入阻断剂6-氰基-7-硝基喹啉-2,3二酮 (CNQX) 可消除mEPSCs。使用Clampfit 9.0进行数据分析。结果: P4至P11, 大鼠初级视皮层2/3层锥体神经元AMPA介导的mEPSCs的波幅呈现上升趋势, 频率自P7至P11逐渐增加, 上升时间常数及下降时间常数均呈缩短趋势, 以下降时间常数变化为著。P4至P7可见“单通道样”电流形态。结论: 在大鼠睁眼前初级视皮层2/3层锥体神经元亦存在突触自身稳态可塑性调节机制, 其作用特点不同于睁眼后。

关键词 [大鼠](#) [视皮质](#) [突触可塑性](#) [微小兴奋性突触后电流](#)

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Homeostatic synaptic plasticity in 2/3 layers of rats primary visual cortex before eyes opening

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Abstract

AIM: To evaluate if homeostatic plasticity exists by changing miniature excitatory postsynaptic currents (mEPSCs) in infantile visual cortex of Wistar rats before their eyes open. METHODS: Whole cell voltage-clamp responses were recorded in brain slices from 2/3 layer of pyramidal cells in the primary visual cortex of rats, aged from 4 to 11 postnatal day before they opened their eyes. Holding voltage was -70 mV. α -amino-3-hydroxy-5-methyl-4-isoxazole propionic acid (AMPA)-mediated mEPSCs were isolated in artificial cerebrospinal fluid with tetrodotoxin, bicuculline methchloride and D-2-amino-5-phosphvaleric acid. Statistical differences were tested by Clampfit 9.0 and SPSS 11.5. RESULTS: The mEPSCs were eliminated by 6-cyano-7-nitroquinoline-2,3-dione (CNQX). Mean mEPSC amplitudes were increased between P4 and P11. From P7 to P11, mean frequencies were increased. Kinetics of mEPSCs was changed in rise tau and decay tau. Some "single-channel-like" bursts were recorded in these infantile slices. CONCLUSION: Homeostatic plasticity in infantile primary visual cortex is different in rat before and after eyes opening.

Key words [Rats](#) [Visual cortex](#) [Synaptic plasticity](#) [Miniature excitatory postsynaptic currents](#)

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