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Title: Upregulation and internalization of AQP4 in infant rat brains with bacterial meningitis

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关键词: 脑膜炎; 脑水肿; 水通道蛋白4; 内化; 内涵体
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摘要:

目的　观察在幼年大鼠脑膜炎脑水肿模型中水通道蛋白4（aquaporin-4, AQP4）的表达变化及内化现象，探讨AQP4及其内化在脑膜炎脑水肿发生中的作用。　方法　采用幼鼠延髓小脑池注入B族溶血性链球菌建立细菌性脑膜炎模型，采用干湿质量法、伊文思蓝含量测定法、免疫印迹法分别检测脑膜炎幼年大鼠脑含水量、血脑屏障通透性以及AQP4的表达水平，运用免疫荧光双标的方法检测AQP4分别与早期内涵体标记物EEA1和晚期内涵体标记物MPR的共表达。　结果　①实验组脑含水量（81.4±2.3）%较对照组（77.3±1.6）%明显增加（$P<0.05$）；②实验组AQP4表达水平（57.41±7.00）%较对照组（44.50±7.45）%明显增加（$P<0.05$）；③实验组依文思蓝含量（4.35±0.21）μg/g较对照组（4.27±0.33）μg/g无统计学差异（$P>0.05$）；④脑膜炎模型中，AQP4分别与EEA1和MPR共表达。　结论　在幼年大鼠脑膜炎脑水肿模型中，脑内AQP4表达上调，同时存在AQP4内化的现象。

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Abstract: Objective To examine the alteration of aquaporin-4 (AQP4) expression and investigate the occurrence AQP4 internalization in rat brains with bacterial meningitis, so as to explore the possible role of AQP4 and its internalization in the brain edema of meningitis. Methods Group B hemolytic Streptococcus was injected into the cerebellar medulla pool of rat brain to establish a bacterial meningitis model. The brain water content, integrity of blood-brain barrier and expression of AQP4 were measured by wet and dry weight methods, Evans blue (EB) staining and Western blotting, respectively. Double immunofluorescence labeling was applied to detect the co-expression of AQP4 with early endosome antigen 1 (EEA1) as well as mannose-6-phosphate receptor (MPR), respectively. Results Compared with control group, the brain water content in the model group increased [(81.4±2.3)% *vs* (77.3±1.6)%], AQP4 expression increased [(57.41±7.00)% *vs* (44.50±7.45)%], and Evans Blue content had no significant change (4.35±0.21 *vs* 4.27±0.33 μg/g). The co-expression of AQP4 with EEA1 and that of AQP4 with MPR were observed in meningitic rat brains. Conclusion AQP4 in rat brains is up-regulated in the bacterial meningitis model. Meanwhile, the internalization of AQP4 occurs in the model.

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