發育或傷害過程中大白鼠嗅球內小神經膠細胞胞膜醣蛋白之變化:凝集素標誌下之超微結構研究

The alterations of membrane glycoproteins of microglia in the olfactory bulb of rats under normal development and unilateral ZnSO4-treatment

中文摘要

根據過去的研究得知大白鼠出生初期，腦組織內早期的變形性小神經膠細胞分化成分枝性小神經膠細胞的過程中，其胞膜醣蛋白的凝集素標誌反應會有其特殊的轉變形式。由於嗅球在成鼠階段仍有神經細胞自然退化或死亡的獨特現象，所以作者想利用凝集素(GSA I-B4)來標誌大白鼠嗅球內小神經膠細胞，以探討發育中嗅球內的小神經膠細胞，在分化成熟過程中包膜醣蛋白的變化情形。作者發現嗅球不同層組織內有不同型態的小神經膠細胞代表其不同的分化程度，此分化過程類似其他腦組織內之小神經膠細胞。在發育中的嗅球內，作者觀察到外叢層的小神經膠細胞最早成熟，表現非常微弱的凝集素標誌。然而，在成熟嗅球組織向顆粒性細胞層或室膜下層內，仍然有某些小神經膠細胞具有明顯的凝集素反應，經由電子鏡觀察，可發現其高爾基氏體的內側小囊也有很明顯的標誌，而其他層小神經膠細胞的高爾基氏體卻沒有被凝集素標誌。由此結果可推測，嗅球顆粒性細胞層或室膜下層內的分枝性小神經膠細胞可能仍處於較活耀的狀態下，此係由於成鼠嗅球的神經細胞有自然死亡的獨特現象(Kaplan et al.,1985)，需要一些小神經膠細胞處於活化的狀態，行使其吞噬的功能以清除那些細胞碎屑。小神經膠細胞會因應腦組織受傷萎縮而再度活化成吞噬性細胞。因此，本研究發現經由硫酸鋅溶液注入大白鼠鼻腔所造成的化學性傷害，嗅球內嗅神經層及嗅神經小球層有明顯縮小的現象。此受傷的嗅神經層及嗅神經小球層內，有些小神經膠細胞明顯地增強細胞膜內側小囊以及相關聯之小球泡亦有凝集素的反應。此活化小神經膠細胞的凝集素標誌型式類似那些分化中的小神經膠細胞，於是我們推測嗅球嗅神經小球層內，小神經膠細胞會因應硫酸鋅溶液而活化。

英文摘要

In the previous study, the differential lectin labeling of membrane glycoprotein in amoeboid microglia during its transformation into ramified microglia had been shown in corpus callisum of the postnatal rat. Since the spontaneous neuronal degeneration and neurogenesis exists in olfactory bulb of the adult brain, we have used lectin(GSA I-B4)as a marker to examine the alteration of lectin-labelled membranous glycoprotein in the developing olfactory bulb. The present study has shown that there are several morphological types of microglia representing different degress of cell

differentiation in the bulb's architectural laminae. A gradual dimimnution of lectin staining is observed when the nascent round cells transformed into the mature ramified microglia. The microglial differentiation in the developing bulb is similar to that in the other brain tissues. Microglia in the external plexiform layer of olfactory bulb are first mature and expressed very weak lectin activity. However, in the olfactory nerve layer and granule cell layer and subependymal layer of the mature bulbs, there are still a few microglial cells showed intense lectin lectin labeling. Ultrastructurally, a remarkable labeling in the trans cisternae of Golgi apparatus also can be found in these cells. Microglia in other bulb laminae exhibited a negative reaction for the isolectin at Golgi apparatus. It is postulated that ramified microglia in these layers are in active state in response to the spontaneous cell death and genesis of bulb neurons. The intranasal irrigation of zinc sulfate(ZnSO4)may destroy the olfactory receptors and thus eliminates their olfactory sensitivity. In this study, ZnSO4 administration layer, in which a few microglial cells have been activated into phagocytic cells and show increased lectin-labelling at their cell membrance. The GSA I-B4 labelling is also conspicuously localized at the trans saccules of Golgi apparatus and its related vesicles. The lectin-labelling pattern of these phagocytic cells is similar to that of developing microglia, suggesting that the bulb microglia in the olfactory nerve layer and glomerular layer are activated following ZnSO4 lesion.