BOTH FETAL MACROPHAGES AND BLOOD MONOCYTES ARE CELL PRECURSORS OF AMEBOID MICROGLIA

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At present, it is well-established that ramified microglia in the adult brain derive from ameboid microglia observed during development. Although the mesodermic nature of ameboid microglia is accepted, the precise origin of their precursors is still a matter of controversity. In the current work, we studied the nature of ameboid microglial cell precursors in the developing rat brain from embryonic (E) day 14 to postnatal (P) day 18 by means of tomato lectin (TL) histochemistry, histoenzymatic demonstration of nucleoside triphosphatase (NTPase), nucleoside diphosphatase (NDPase), 5'-nucleotidase (5'-Nase) and purine nucleoside phosphorilase (PNPase) activities, and immunohistochemical demonstration of lymphocyte functional associated antigen-1 alpha (LFA-1α),

Based on localization, time course of appearance and phenotype of the stained cells, our results demonstrate the existence of two well-defined populations of ameboid microglial cells: ameboid microglia (AM) type 1 and AM type 2. AM type 1 are observed at earlier stages (E14-E17) and distribute either in the vicinities of the pia or in close association with blood vessels that invade the nervous tissue from the surrounding connective tissue of meninges. These cells have a roundish or elongate cell body and often show pseudopodia. They are TL +, NTPase +, NDPase +, 5'-Nase - and LFA-1α -. Mostly, these cells do not display PNPase activity. By contrast AM type 2 are mainly demonstrated from E18 until the early second postnatal week and distribute in the developing white matter areas, showing a special relationship to the blood vessels of these areas during the embryonic period. These cells are round shaped and sometimes show filopodia extending from the cell body. They are TL +, NTPase +, NDPase +, 5'-Nase+ and, frequently, PNPase + and LFA-1α+.

We conclude that ameboid microglial cell progenitors may derive from, at least, two different cell precursors: fetal macrophages and blood monocytes. Fetal macrophages may enter into the nervous tissue from meninges transforming in AM type 1 while blood monocytes may migrate into the nervous tissue from parenchymal blood vessels and differentiate in AM type 2.

This work was supported by DGICYT grant nº PB95-0662.