In vivo and in vitro studies of microglia alternative activation

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Microglia have the unique property to sense any pathological event and to immediately undergo biochemical and morphological transformations that destroy the damaging insult and trigger tissue repair. The alternative M2 phenotype of microglia during the inflammatory reaction is associated with anti-inflammatory and regenerative properties, although the ability of microglia within specific brain regions to respond to polarizing signals is not understood yet. The aim of the present study is thus to optimize experimental models of M2 polarization by using interleukin-4 (IL4) administration to microglia *in vivo*[1] or *in vitro*. The expression of M2 genes and proteins was evaluated at different time points following icv IL4 in diverse mouse brain areas or in microglia primary cultures. Our data show that there is a region-specific capacity to trigger the IL4 response in mouse brain; moreover, we demonstrate that a subpopulation of microglia is able to respond to IL4. The heterogeneity of microglia M2 activation potential might involve the regulatory activity of surrounding cells, as demonstrated by our in vitro data. Altogether, our study hints to region-specific peculiarities in the regenerative potential of microglia, with relevant physio-pathological consequences for brain health and disease.

[1]Pepe G. et al, J Neuroinflammation 2014