

CORRELATION BETWEEN IL1 β EXPRESSION LEVEL AND MORPHOLOGICAL PARAMETERS PROVES THE USEFULNESS OF MORPHOLOGY MEASURES TO PREDICT THE DEGREE OF ACTIVATION OF MICROGLIAL CELLS

M. Fernández-Arjona, J. M. Grondona, P. Fernández-Llebrez, M.D. López-Ávalos

Instituto de Investigación Biomédica de Málaga (IBIMA), Facultad de Ciencias, Universidad de Málaga, 29071. Málaga, Spain

It is well known that microglial cells undergo an important change in morphology upon activation, so that form and function are intimately related. Upon activation, microglia cell body enlarges, its ramifications shortens and become thicker. In parallel, a variety of cytokines and inflammatory mediators such as IL1 β are released. However the activation process is not all-or-nothing. Rather, cells in subtle activation states or in a deactivation process can occur, so intermediate not obvious phenotypes may appear.

Thus, we aimed to correlate the expression level of a well-defined marker of activation, IL1 β , with different morphological parameters. To do so, we used an intracerebroventricular injection of neuraminidase to produce an acute inflammation in rats. Brain sections were double-stained with IBA1 to have an image of the whole cell and its ramifications, and with IL1 β to assess the level of activation. Images were captured from septofimbria (close to the injection site) and from the hypothalamus. A ratio of IL1 β -positive pixels to IBA1-positive pixels was used to estimate the level of IL1 β expression for each cell. Single microglial cell images were processed with ImageJ software to obtain outlined and filled shapes, which were used to obtain (by means of FracLac plug in) the following morphological parameters: *fractal dimension*, *lacunarity*, *area*, *density* and *perimeter*.

All parameters showed a significant correlation with the level of expression of IL1 β . This occurred in cells sampled from the two brain areas studied. *Density*, *lacunarity* and *perimeter* resulted as the best predictor parameters of activation, that is, those with a better correlation with the level of expression of IL1 β . *Area*, an extensively used parameter to assess microglial activation, presented the least significant correlation.

Thus, objectively measured morphological parameters correlate with the level of expression of IL1 β , and could therefore be used as predictors of the activation level of microglial cells.