

Role and function of microglial cells



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Microglia is an endogenous immunohomeostatic neuronal support cells in the Central nervous system (CNS) (Kettenmann et al., 2011). Microglial cells are responsible for surveying brain and spinal cord (invertebrates and vertebrates), in protection from pathogens and injury, phagocytosis, and cytotoxicity and immune homeostasis (Garden and Moller, 2006). Microglia's homeostatic function achieves profound salubrious therapeutic state corollary for prophylaxis of neurological health in the central nervous system (Garden and Moller, 2006). Microglia with astrocyte biochemically maintains endothelial cells that creates blood-brain barrier, through this, pathogenic infection are unable to reach vulnerable nervous tissues (Dissing-Olesen et al., 2007). Furthermore, corollary on specification of homeostasis in immunological functions are based on their site and existing paradigm, and some of Microglial cells immensely depends on the level of plasticity in order to reach the standard of capability of immunity (Gehrmann et al., 1995).

There are different forms of microglial cells based on their existing sites. In the perinatal white matter area, specifically in corpus callosum, microglial cells forms " Amoeboid" (Gehrmann J et al., 1995). In addition, this form allows microglial to change its location freely, all over the neural tissue (Gehrmann et al., 1995). There is also a form specified from its stationary, and this called " ramified", only its outlets surveying the throughout the brain and spinal cord (Aloisi, 2001). This ramified is also known for its sensitivity in physiological changes (Aloisi, 2001). Furthermore, activated microglia are included to types of microglia that have two parts, non-phagocytic & phagocytic. This is the type of microglia that expresses

allograft inflammatory factor 1 (Ito, 1998). When the microglia acts to its ramified state, non-phagocytic is the part of classified biochemical response that operated to complete active phagocytic form (Aosis, 2001). Non-phagocytic is the microglial form that can be activated by numerous of neural substances such as glutamate receptors and lipopolysaccharide (Aosis, 2001). However, phagocytic has the ability to inflammatory healing factors that travels throughout the damaged tissues (Gehrmann et al., 1995). In addition phagocytic are the most sensitive form microglia that responses as maximum immune protection and sending molecular immune substance for T-lymphocytes activation (Gehrmann et al., 1995). One of the types of microglial is gitter cell (Rissi et al., 2006). This is the type of microglial that results of phagocytosis processes within infectious matter (Rissi et al., 2006). Furthermore, there is also different type in comparison to other microglia. Perivascular, this type of microglia focuses on site, also its distinction found between walls of extracellular matrix, basal lamina (Gehrmann et al., 1995). In addition their function is to proliferate endothelial cells for rapid repair and creation of vessels (Gehrmann et al., 1995). Lastly, juxtavascular is similar to perivascular basing to its distinct location with virtually connected with basal lamina (Gehrmann et al., 1995).

Microglial cells are responsible for immunohomeostatic response to CNS, and have different functions (Kettenmann et al., 2011). The most essential function of Microglia is phagocytosis, known for engulfment of various cells via actin-myosin contractile system (Stuart and Ezekowitz, 2005). Microglia is very sensitive in every vicissitudes that's why they were called scavenger (Ferrer et al., 1990). It responses throughout CNS to hunt foreign organisms

or abnormal matter, and repair the impaired cells (Ferrer et al., 1990). One of the killing acumen of Microglial cell's function is called cytotoxicity.

Cytotoxicity is the ability of microglial cells to destroy pathogens via release of cytotoxic substance (Gehrmann et al., 1995). In addition, cytotoxic is known for producing plenty of quantity of Hydrogen peroxide and Nitrogen oxide corollary to activate respiratory burst (Gehrmann et al., 1995).

Respiratory burst is an important process that proliferate immune system (Bylund et al., 2014). Furthermore, microglia also has the ability to produce antigens to activate an immune response (Gehrmann et al., 1995).

The three abilities of microglia are focused on regeneration of nerves. Firstly, Microglia has the ability to remove axon terminals that synapsed to damaged tissue in order to proliferate regeneration of the tissue and this is called “ synaptic stripping” (Gehrmann et al., 1995). Secondly, microglia has processes in regeneration nervous tissue that includes synaptic stripping, production of cytokines, luring of astrocytes to infected areas, and creation of gitter cells (Gehrmann et al., 1995). Moreover, considering the importance of microglial, without microglial cells, the CNS will not survive (mortality) from external environment substance and pathogens. Thirdly, microglial cells are also responsible for homeostasis, negative and positive feedback loop, in CNS (Aloisi, 2001). Microglia is known for achieving complex communication via triggering signals molecules with other astrocytes, neural tissues, T lymphocytes and hematopoietic stem cells (Aloisi, 2001).

In conclusion, microglial cells are responsible for immune system and homeostasis in Central nervous system. Microglial cells has different function in diverse locations. It has the ability to protect CNS from pathogens that will

cause neuroinflammation, and regenerate impaired tissues with synaptic stripping, & production of astrocytes.

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