Dendritic cell

see Dendritic cell therapy.

Dendritic cells (DCs) are antigen-presenting cells (also known as accessory cells) of the mammalian immune system. Their main function is to process antigen material and present it on the cell surface to the T cells of the immune system. They act as messengers between the innate and the adaptive immune systems.

Dendritic cells are present in those tissues that are in contact with the external environment, such as the skin (where there is a specialized dendritic cell type called the Langerhans cell) and the inner lining of the nose, lungs, stomach and intestines. They can also be found in an immature state in the blood. Once activated, they migrate to the lymph nodes where they interact with T cells and B cells to initiate and shape the adaptive immune response. At certain development stages they grow branched projections, the dendrites that give the cell its name (δένδρον or déndron being Greek for “tree”). While similar in appearance, these are structures distinct from the dendrites of neurons. Immature dendritic cells are also called veiled cells, as they possess large cytoplasmic 'veils' rather than dendrites.

Traumatic brain injury affects the distribution pattern of DCs and induces an imbalance among DC subsets in both lymphoid and non-lymphoid organs. In addition, the current study demonstrates that TBI results in reduced levels of ROS in DCs on day 3 and day 7 after TBI, which may explain the altered DC differentiation paradigm following TBI. A deeper understanding of the molecular mechanisms that contribute to DC defects following TBI would be essential and beneficial in treating infections in patients with acute central nervous system (CNS) injuries, such as TBI, stroke, and spinal cord injury [1].

Epidermal growth factor receptor 3 (EGFRvIII) is present in approximately one-third of glioblastoma (GBM) patients. It is never found in normal tissues; therefore, it represents a candidate target for glioblastoma immunotherapy. PEPvIII, a peptide sequence from EGFRvIII, was designed to represent a target of glioma and is presented by MHC I/II complexes. Dendritic cells (DCs) have great potential to sensitize CD4+ T and CD8+ T cells to precisely target and eradicate GBM.

Li et al. show that PEPvIII could be loaded by DCs and presented to T lymphocytes, especially PEPvIII-specific CTLs, to precisely kill U87-EGFRvIII cells. In addition to inhibiting proliferation and inducing the apoptosis of U87-EGFRvIII cells, miR-326 also reduced the expression of TGF-β1 in the tumour environment, resulting in improved efficacy of T cell activation and killing via suppressing the SMO/Gli2 axis, which at least partially reversed the immunosuppressive environment. Furthermore, combining the EGFRvIII-DC vaccine with miR-326 was more effective in killing U87-EGFRvIII cells compared with the administration of either one alone. This finding suggested that a DC-based vaccine combined with miR-326 may induce more powerful anti-tumour immunity against GBM cells that express a relevant antigen, which provides a promising approach for GBM immunotherapy [2].

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2)
Li J, Wang F, Wang G, Sun Y, Cai J, Liu X, Zhang J, Lu X, Li Y, Chen M, Chen L, Jiang C. Combination epidermal growth factor receptor variant III peptide-pulsed dendritic cell vaccine with miR-326 results in enhanced killing on EGFRvIII-positive cells. Oncotarget. 2017 Feb 17. doi: 10.18632/oncotarget.15445. [Epub ahead of print] PubMed PMID: 28412740.