Dendritic cells and skin immune system

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The human skin immune system (SIS) including skin associated lymphoid tissue (SALT) and humoral factors comprised of two functional parts: (1) innate (2) adaptive.

Cells of the innate immune system include macrophages and dendritic cells (DCs) which use pattern recognition receptors such as toll-like receptors (TLRs) and respond rapidly without specificity. Keratinocytes (KC), complements, antimicrobial peptides (AMPs), cytokines, neuropeptides, eicosanoids, and reactive oxygen species (ROS) are also components of innate immune system.

Cells of the adaptive immune system are T and B lymphocytes which use specific antigen receptors, respond slowly and retain memory. DCs including Langerhans cells (LCs), dermal dendritic cells (DDCs), KC, endothelial cells and cytokines are other constituents.

DCs are gate keeper of SIS and play a role as professional antigen presenting cells (APCs) and the only APCs capable of interacting with naïve T cells. Homeostatic DCs comprised of epidermal LCs and CD11c+ dermal dendritic cells (DDCs) and inflammatory DCs comprised of plasmacytoid DC (pDCs) and CD11c+CD1c-inflammatory dendritic skin cells (IDSCs) derive from hematopoietic stem and progenitor cells (HSPC). In psoriasis, TNF and iNOS producing DCs (Tip-DCs), a new type of myeloid CD11c+ DCs are increased.

Among these 4 types of DCs, pDCs are derived from common lymphoid progenitor cells (CLPC) by activation of transcription factor IRF-8 and express TLR-7 and TLR-9. pDCs can produce massive IFN-α in response to TLR-ligands such as viral ssRNA or CpG DNA leading to protection against viral infection.

These various DCs interacting with SIS have important pathogenetic roles in atopic dermatitis, psoriasis and other skin diseases.