**Table 2:** A summary of the different Dendritic cell subsets along with their function, markers and mediators.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Subtype:CD1c+ myeloid  | They are induced by LPS, IC, flagellin, R848 | These cells express a diverse range of TLRs and Lectins for antigen uptake, transport and presentation.Good stimulators of naïve CD4 T cells | They express CD11b, CD11c, CD13, CD33, CD172 (SIRP) and CD45RO; Dectin-1, Dectin-2 | They produce TNF-, IL-8, IL-10, IL-23;IL-12 is produced in response to activation by R848 when it ligates to the TLR 7/8 receptor. | They produce IFN- inducible protein-10 (IP-10), monokine induced by interferon γ (MIG) and, thymus and activation-regulated chemokine (TARC) | [1],[2],[3],[4],[5] |
| Subtype:CD141high myeloid | They are induced by ICs, R848 | The cells take up dead cells via CLEC9A. They also cross-present antigen to CD8+ T cell along with sensing viral nucleic acids using TLR3 and TLR8. | Wide expression of CD141 on CD14+ migratory DCs, CD1c+ DCs and monocytes cultured with vitamin D. Therefore, differentiation is based on the lower expression of CD11b and CD11c. | They produce TNF- and lower levels of IL-12 and p70 | They produce CXCL10, IFN- | [6],[7],[1],[8],[9] |
| Subtype:CD14+ | They are induced by Histamine | They do not stimulate naïve T cells efficiently. They can differentiate into Langerhans cells and mature DCs. Therefore, they are quiescent tissue monocytes. | CD11c is common with monocytes but lack CD1c and CD141, CCR7.They express: CD209, FXIIIA, CD163, CD141 | They only produce IL-10 |  | [1],[10] |
| They lack myeloid antigens CD11b, CD11c, CD13 and CD33. They are present in Lymph Node in almost 20% MHCII positive cells | On encountering active or inactivated pathogenic viruses, bacteria and parasites. | Formation of Follicular TH Cell. They can instigate T cell response and respond to viral infections by secretion of large amounts of IFN- Fresh pDCs do not prime naïve T cells and hence are immature. They induce Treg cells and can sense DNA released from apoptotic cells. | They express CD45RA with variable CD2 and CD7 expression. They may have TCR; CD123; CD303; CD304; TLR7, TLR9.CCR5, CCR7, and CXCR3 | They produce type-I IFNs, TNF-α, and IL-6 | They produce IFN-pro-inflammatory chemokine CCL3/macrophage inflammatory protein (MIP)-1α | [1],[11],[12], [13],[14],[15] |
| They mature from CD34+ myeloid cells that are CD14-. They can be found in skin-draining lymph nodes (para cortex region). | They are induced by TNF- from CD34+CD14- T cells myeloid cells | They mature and work in antigen presentation but lack TLRs hence induce Treg cells and produce IL-22 | They express Langerin, CD1a, CD36, ATPase, FCR1 | They produce IL-15, IL-22 | They produce macrophage-derived chemokine/stimulated T cell chemotactic protein (CCL22), Th1/Th2 profile | [1],[16],[17],[18],[19] |
| Derived from CD14+ blood monocytes | They are induced by GM-CSF and IL-4 | Different inflammatory environment generates a diverse range of monocyte derived DCs. They stimulate naïve CD4+ T cell and are involved in antigen presentation to CD8+ T cell. | They express CD1c, CD1a, CD206, FcRI, SIRP and lack CD16 and CD209 | They produce IL-1, TNF-, IL-6 and IL-23 and stimulate Th17 responses; IL-1, IL-6, TNF-a, IL-12 and IL-23 | They produce MCP-1, RANTES, Th1/Th17 profile | [1],[20], [21],[22]  |
| A subset of CD16+ monocyte | They are induced by LPS in presence of Histamine | They are reactive to self-RNA-LL37 | They express 6-Sulpho LacNAc (SLAN), H4R | They produce TNF-, IL-1, IL-6 and IL-12 | They produce Th1/Th17 profile | [1],[23],[24] |

1. Collin M, McGovern N, Haniffa M. Human dendritic cell subsets. Immunology. 2013;140(1):22-30. doi: 10.1111/imm.12117.

2. van der Aar AMG, Sylva-Steenland RMR, Bos JD, et al. Cutting Edge: Loss of TLR2, TLR4, and TLR5 on Langerhans Cells Abolishes Bacterial Recognition. The Journal of Immunology. 2007 February 15, 2007;178(4):1986-1990. doi: 10.4049/jimmunol.178.4.1986.

3. Mittag D, Proietto AI, Loudovaris T, et al. Human Dendritic Cell Subsets from Spleen and Blood Are Similar in Phenotype and Function but Modified by Donor Health Status. The Journal of Immunology. 2011 June 1, 2011;186(11):6207-6217. doi: 10.4049/jimmunol.1002632.

4. Morelli AE, Rubin JP, Erdos G, et al. CD4+ T Cell Responses Elicited by Different Subsets of Human Skin Migratory Dendritic Cells. The Journal of Immunology. 2005 December 15, 2005;175(12):7905-7915. doi: 10.4049/jimmunol.175.12.7905.

5. Moret FM, Hack CE, van der Wurff-Jacobs KM, et al. Intra-articular CD1c-expressing myeloid dendritic cells from rheumatoid arthritis patients express a unique set of T cell-attracting chemokines and spontaneously induce Th1, Th17 and Th2 cell activity. Arthritis Res Ther. 2013;15(5):R155. doi: 10.1186/ar4338. PubMed PMID: 24286358; PubMed Central PMCID: PMC3979121.

6. Bachem A, Güttler S, Hartung E, et al. Superior antigen cross-presentation and XCR1 expression define human CD11c+CD141+ cells as homologues of mouse CD8+ dendritic cells. The Journal of Experimental Medicine. 2010 June 7, 2010;207(6):1273-1281. doi: 10.1084/jem.20100348.

7. Lauterbach H, Bathke B, Gilles S, et al. Mouse CD8α+ DCs and human BDCA3+ DCs are major producers of IFN-λ in response to poly IC. The Journal of Experimental Medicine. 2010 November 22, 2010;207(12):2703-2717. doi: 10.1084/jem.20092720.

8. Haniffa M, Shin A, Bigley V, et al. Human Tissues Contain CD141hi Cross-Presenting Dendritic Cells with Functional Homology to Mouse CD103+ Nonlymphoid Dendritic Cells. Immunity. 2012 7/27/;37(1):60-73. doi: 10.1016/j.immuni.2012.04.012.

9. Desch AN, Gibbings SL, Clambey ET, et al. Dendritic cell subsets require cis-activation for cytotoxic CD8 T-cell induction [Article]. Nat Commun. 2014 08/19/online;5. doi: 10.1038/ncomms5674.

10. Katoh N, Soga F, Nara T, et al. Histamine Induces the Generation of Monocyte-Derived Dendritic Cells that Express CD14 but not CD1a. Journal of Investigative Dermatology.125(4):753-760. doi: 10.1111/j.0022-202X.2005.23891.x.

11. Gilliet M, Cao W, Liu Y-J. Plasmacytoid dendritic cells: sensing nucleic acids in viral infection and autoimmune diseases [10.1038/nri2358]. Nat Rev Immunol. 2008 08//print;8(8):594-606.

12. Colonna M, Trinchieri G, Liu YJ. Plasmacytoid dendritic cells in immunity. Nat Immunol. 2004 Dec;5(12):1219-26. doi: 10.1038/ni1141. PubMed PMID: 15549123.

13. Ogata M, Ito T, Shimamoto K, et al. Plasmacytoid dendritic cells have a cytokine-producing capacity to enhance ICOS ligand-mediated IL-10 production during T-cell priming. International Immunology. 2013 March 1, 2013;25(3):171-182. doi: 10.1093/intimm/dxs103.

14. Penna G, Vulcano M, Sozzani S, et al. Differential migration behavior and chemokine production by myeloid and plasmacytoid dendritic cells. Human Immunology. 2002 12//;63(12):1164-1171. doi: 10.1016/S0198-8859(02)00755-3.

15. Liu Y-J. IPC: Professional Type 1 Interferon-Producing Cells and Plasmacytoid Dendritic Cell Precursors. Annual Review of Immunology. 2005;23(1):275-306. doi: doi:10.1146/annurev.immunol.23.021704.115633. PubMed PMID: 15771572.

16. Banchereau J, Thompson-Snipes L, Zurawski S, et al. The differential production of cytokines by human Langerhans cells and dermal CD14+ DCs controls CTL priming. Blood. 2012 2012-06-14 00:00:00;119(24):5742-5749. doi: 10.1182/blood-2011-08-371245.

17. Ross R, Ross X-L, Ghadially H, et al. Mouse Langerhans Cells Differentially Express an Activated T Cell-Attracting CC Chemokine. Journal of Investigative Dermatology. 1999;113(6):991-998. doi: 10.1046/j.1523-1747.1999.00803.x.

18. Ito T, Inaba M, Inaba K, et al. A CD1a+/CD11c+ Subset of Human Blood Dendritic Cells Is a Direct Precursor of Langerhans Cells. The Journal of Immunology. 1999 August 1, 1999;163(3):1409-1419.

19. de Jong A, Pena-Cruz V, Cheng T-Y, et al. CD1a-autoreactive T cells are a normal component of the human [alpha][beta] T cell repertoire. Nat Immunol. 2010;11(12):1102-1109. doi: 10.1038/ni.1956.

20. Romani N, Gruner S, Brang D, et al. Proliferating dendritic cell progenitors in human blood. The Journal of Experimental Medicine. 1994 July 1, 1994;180(1):83-93. doi: 10.1084/jem.180.1.83.

21. Ebner S, Ratzinger G, Krösbacher B, et al. Production of IL-12 by Human Monocyte-Derived Dendritic Cells Is Optimal When the Stimulus Is Given at the Onset of Maturation, and Is Further Enhanced by IL-4. The Journal of Immunology. 2001 January 1, 2001;166(1):633-641. doi: 10.4049/jimmunol.166.1.633.

22. ZHU Kejian SQ, Mrowietz Ulrich, ZHENG Min. Human monocyte-derived dendritic cells expressing both chemotactic cytokines IL-8, MCP-1, RANTES and their receptors, and their selective migration to these chemokines. Chin Med J. 2000;113(12):1124-1128. doi: <http://124.205.33.103:81/ch/reader/view_abstract.aspx?file_no=2000121124&flag=1>.

23. Hänsel A, Günther C, Ingwersen J, et al. Human slan (6-sulfo LacNAc) dendritic cells are inflammatory dermal dendritic cells in psoriasis and drive strong Th17/Th1 T-cell responses. Journal of Allergy and Clinical Immunology. 2011 3//;127(3):787-794.e9. doi: 10.1016/j.jaci.2010.12.009.

24. Gschwandtner M, Schäkel K, Werfel T, et al. Histamine H4 receptor activation on human slan-dendritic cells down-regulates their pro-inflammatory capacity. Immunology. 2011;132(1):49-56. doi: 10.1111/j.1365-2567.2010.03336.x.