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Neuro-immune cross talk and dendritic cells based immunotherapies for neurological diseases

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For last several years, our laboratory has placed tremendous efforts in understanding retroviral pathogenesis both in periphery and in CNS utilizing human T-cell leukemia virus (HTLV) as a model pathogen with prime focus on dendritic cells (DCs). HTLV-1 is not only a good model for human chronic viral infection but also of associated neurological complications. Therefore, through these studies we were able to provide new scientific insights and paradigms in the areas of neuroimmunology and neurovirology. Our long-standing research work with HTLV-1 helped in bridging two important fields of Neuroscience and Immunology while strengthening DCs' presence and functions within CNS. This is by means of our original work providing direct evidence for the ability of circulating DCs to migrate across the inflamed blood-brain barrier during an active ongoing neuroinflammatory condition such as experimental autoimmune encephalitis (EAE) by live intravital video microscopy. This was further substantiated by a variety of non-invasive imaging tools such as NIR, SPECT-CT, MRI, PET, etc. These studies have identified lectins (i.e., CLEC12A) as key molecular targets for potentially new DC-based immunotherapeutic strategies against neuroinflammatory diseases such as MS. Fairly recently; we undertook similar approach toward HIV-1 CNS infection to investigate if follicular DCs (fDCs) within deep cerebral lymph nodes (CLNs) could be potential reservoir for HIV/SIV CNS infection. We are also interested in investigating novel means to inhibit HIV-fDC interactions as relate to the CNS pathogenesis. Taken together, our work on DC-CNS trafficking has helped changed the central dogma of CNS being the immune privileged site.

Recent Publications

1. Rahman, S., Manuel, S., Khan, Z. K., Wigdahl, B., Acheampong, E., Tangy, F., and P. Jain (2010) Depletion of dendritic cells enhances susceptibility to cell-free but not cell-associated infection of HTLV-1 in CD11c-DTR-transgenic mice. Journal of Immunology, 184 (10): 5553-5561.
2. Jain, P., C. Coisne, G. Enzmann, R. Rottapel, and B. Engelhardt. (2010) α4β1-integrin mediates the recruitment of immature dendritic cells across the blood-brain barrier during experimental autoimmune encephalomyelitis. Journal of Immunology, 184 (12): 7196-7206.
3. Sagar, D., Foss, C., Baz, R., Martin, G., Khan, Z. K., and P. Jain (2012) Mechanisms of dendritic cell trafficking across the blood-brain barrier. Journal of Neuroimmune Pharmacology, 7:74-94.
4. Sagar, D., Lamontagne, A., Foss, C. Khan, Z. K., Pomper, M., and P. Jain (2012) Dendritic cells CNS recruitment correlates with disease severity in EAE *via* CCL2 chemotaxis at the blood-brain barrier through paracellular transmigration and ERK activation. Journal of Neuroinflammation, 9:245-260.
5. Hollenbach, R., Sagar, D., Hegde R., Callen, S., Yao, H., Khan, Z. K., Buch, S., and P. Jain (2014) Effect of morphine and SIV on dendritic cell trafficking into the central nervous system of rhesus macaques. Journal of NeuroVirology, 20: 175-183.

Biography

Pooja Jain is a tenured Professor in the Department of Microbiology and Immunology at the Drexel University College of Medicine, USA. She also holds joint appointment as a Professor of Neurobiology and Anatomy at DrexelMed. She is well respected in the field of Neurovirology/Neuroimmunology and made seminal contributions with her studies on HTLV-associated cancer and neuroinflammation with prime focus on the dendritic cells. She provided first live *in vivo* imaging evidence of dendritic cells' trafficking into the central nervous system during an active ongoing neuroinflammatory condition and extended her pioneering observations in defining the molecular events and mechanisms underlining cellular migration across the blood-brain barrier. She has authored more than 50 peer-reviewed publications, over 250 abstracts and numerous invited talks across United States and overseas. She has been bestowed with various honors and has served in several NIH study sections. She is currently a Member of AAI, ASM, SFN, ISNV, SNIP and a Life Member for the International Society for Dendritic Cell & Vaccine Science.

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