The role of vimentin in leukocyte amoeboid migration

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Leukocytes use a friction-based migration when moving through the confined interstitial space. The force during movement is generated by dynamic protrusions that create friction with the surrounding extra cellular matrix pushing the cell body forward. Cell migration further implies a continuously cytoskeleton remodeling in order to achieve the shape changes needed to move in between tissues without destroying them. Vimentin is the only cytoplasmic intermediate filament expressed in leukocytes and the most flexible cytoskeletal protein. However, the role of vimentin in leukocyte migration is not well understood. We evaluated the efficiency of migration in leukocytes after vimentin depletion: i*n vivo* by primary dendritic cell homing to lymph nodes and *in vitro*, using micro fabricated channels and confining roofs to ensure a microenvironment as close to the natural as possible. For the migration assays we used primary dendritic cells obtained from vimentin wt and ko mice and the cell line HL-60 with the vimentin mutation Y117L, which prevents filaments assembly. In all migration assays, we observed a significant reduced amount of cells able to migrate among vimentin deficient cells. To investigate whether the migration impairment is due to an alteration in the mechanical properties of the cells we measured cell deformation in suspended cells. This was done either in a passive way by subjecting cells to hydrodynamic forces (RTDC methodology, Zellmechanik, Dresden) or in an active way by analysing cell migration in constricted channels. Our results show that vimentin network might regulate cell deformation in coordination with actin filaments. Taken together, these observations suggest that vimentin plays a role in cell deformation and the association between actin and vimentin may have direct implications on cell migration modulation.