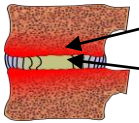
Center of Experimental Rheumatology
Department of Rheumatology

Accumulation of stress-induced molecules recognizing T cells in Modic type 1 changes

Jan Devan[1,2], Nick Herger[1,2], Tamara Mengis[1,2], Irina Heggli[1,2], Melina Perez Vertti Valdes[1,2], Mazda Farshad[3], Oliver Distler[1], Stefan Dudli[1,2]
[1]Center of Experimental Rheumatology, Department of Rheumatology, University Hospital Zurich, University of Zurich, Zurich Switzerland; [2]Department of Physical Medicine and Rheumatology, Balgrist University Hospital, University of Zurich, Switzerland,
[3]Department of Physical Medicine and Rheumatology, Balgrist University Hospital, University of Zurich, Zurich, Switzerland
Contact: jan.devan@usz.ch

1. Introduction



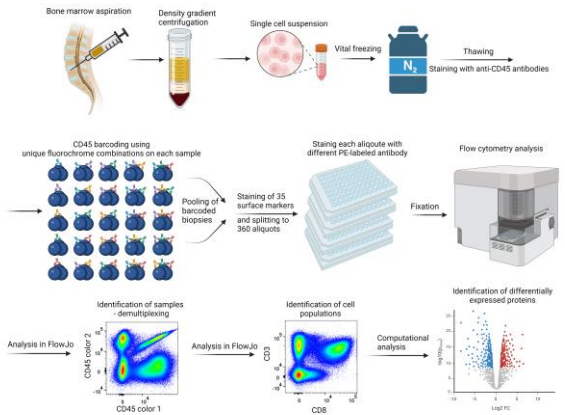
Modic Type 1 changes (MC1)
- associate with vertebrogenic pain
- inflammation

Endplate damage
- always occur with MC1
- expose immune-privileged disc to immune cells of the bone marrow.
- may trigger an auto-immune response.

Knowledge gap:
Immune system remodeling in MC1 lesions unknown.
This could reveal novel pathomechanisms associated with MC1.

2. Methods

Screening of vertebral bone marrow aspirates (n=22, MC1+intra-patient control= 8+8, control patients=6) from patients undergoing lumbar spinal fusion surgery:



3 Results

Effector T cells accumulate in MC1

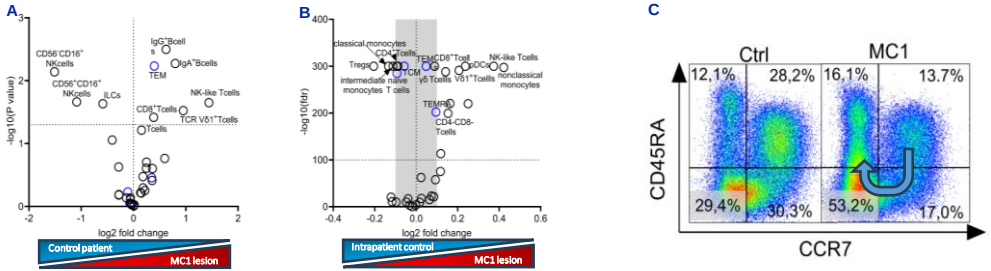


*Figure 1: Comparison of immune cell subset frequencies ( ) and functional maturation stages of T-cells ( ) between MC1 patients and patients without MC1 (**A**) or between MC1 patients and intrapatient controls. (**B**). In A and B, a generalized linear mixed-effect model was used for statistical analysis. (**C**) Representative examples of differences in T-cell functional maturation between MC1 and control sample. Arrows indicate the direction of T cell functional maturation.*

T cells accumulating in MC1 express activating NK receptors

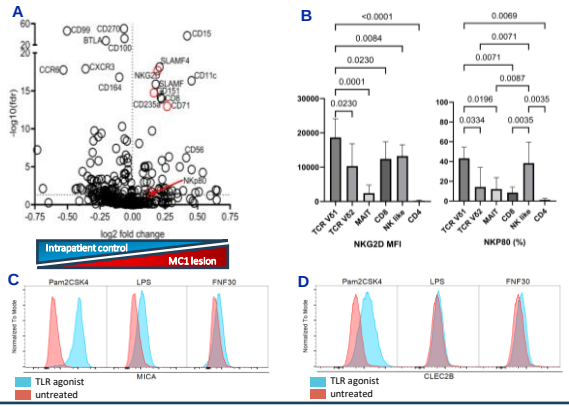


*Figure 2: (**A**) Changes in the expression of surface markers on T cells from MC1 and control tissue. Activating NK receptors are highlighted in red. A generalized linear mixed-effect model was used for statistical analysis. (**B**) Comparison of NKG2D and NKp80 expression between T cell subsets using ANOVA. Bars represent the mean, and error bars represent SD. (**C**) Differences in the expression of NKG2D ligand MICA/B after treatment of THP1 cells with TLR agonists (48h, 20µg/ml). (**D**) Differences in the expression of NKP80 ligand CLEC2B after treatment of THP1 cells with TLR agonists (48h, 20µg/ml).*

4. Conclusion

- MC1 are associated with an accumulation of NK-like T cells and TCR Vδ1⁺ T cells with effector phenotype and the potential to react to stress-induced molecules.
- TLR agonists, including FnF30, can increase the expression of these stress-induced molecules.

Outlook: Future investigation of the role of these cells in MC1 might represent an essential step toward understanding MC1 pathobiology.