Inadequate inflammatory lymphokine up-regulation may contribute to an impaired neonatal immune response. We have reported that decreased GM-CSF mRNA in umbilical cord compared to adult (Ad) peripheral blood MNC is regulated posttranscriptionally. GM-CSF mRNA is also decreased in isolated newborn (Nb) T-cells. At birth, ≥80% of T-cells are CD45RA⁺, whereas <10% are CD45R0⁺. Ad levels of ~50% CD45R0⁺/~50% CD45RA⁺ T-cells are attained by 10 yrs of age.

To determine if reduced expression of GM-CSF mRNA in Nb MNC and T-cells is CD45-dependent, we analyzed its regulation in T-lymphoblastic Jurkat cell lines where CD45 expression is inhibited by an antisense construct (CD45⁻) and then reconstituted with either the CD45R[0] or CD45R[ABC] isoform.

GM-CSF mRNA was significantly reduced to 27.2±4.5% of the wild-type (wt) level in CD45⁻ cells. Reconstitution with the CD45R[0] isoform significantly increased GM-CSF mRNA to 66.4±11.7% of the wt level. Conversely, GM-CSF mRNA was not significantly increased (38.0±8.4%) by reconstitution with the CD45R[ABC] isoform. Nuclear run-on assays showed that GM-CSF transcriptional regulation was not significantly different in wt, CD45⁻, CD45R[0] or CD45R[ABC] reconstituted cells. Increased turnover of GM-CSF mRNA in CD45⁻ and CD45R[ABC]-reconstituted cells was confirmed by determining its t½, which was significantly reduced to 32±15 min in CD45⁻ vs. 103±50 min in wt cells. The t½ was significantly increased to 99±47 min by reconstitution with the CD45R[0] isoform, but not by the CD45R[ABC] isoform (30±17 min).

These results indicate that the CD45R[0] isoform may stabilize GM-CSF mRNA, and that the relative scarcity of CD45R0⁺ T-cells in Nbs could contribute to its more rapid turnover in Nb compared to Ad MNC, revealing a potential target for therapeutic agents to modify neonatal immunity.