JAK pathway induction of c-Myc critical to IL-5 stimulation of cell proliferation and inhibition of apoptosis

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Abstract

Interleukin-5 (IL-5) induction of c-Myc expression is associated with IL-5 inhibition of apoptosis in hematopoietic cells. In this study, TFa1 and TFa8 cells with stable overexpression of IL-5 receptor a (IL-5Ra) subunit in TF-1 cells, a human hematopoietic progenitor cell line which expressed low levels of IL-5Ra, were used to explored how IL-5 up-regulate c-Myc and the role of c-Myc in IL-5 signaling. First, we demonstrate that IL-5 induced c-Myc RNA and protein expressions, as well as activated Janus kinases (JAK1 and JAK2) and signal transducer and activator of transcription-5b (STAT5b). JAK inhibitor AG490 and c-Myc inhibitor 10058-F4, both, reduced IL-5-mediated cell proliferation in a dose- and time-dependent manner. Both, AG490 and 10058-F4, also reduced IL-5-mediated anti-apoptotic activity. Furthermore, AG490 inhibited IL-5-mediated c-Myc induction and promoter activity. We further examined the role of JAK1 and JAK2 in the induction of c-Myc expression using the CD JAK fusion proteins, which consisted of a CD16 extracellular domain, a CD7 transmembrane domain, and either JAK1 (CD JAK1) or JAK2 (CD JAK2) as intracellular domains. Simultaneous activation of JAK1 and JAK2 by anti-CD16 antibody crosslinking of CD JAK1 and CD JAK2 could induced c-Myc expression and promoter activity; AG490 inhibited CD JAK1 and CD JAK2-mediated effects. These results suggest that IL-5 induces cell proliferation and anti-apoptosis through the JAK/c-Myc pathway, and that JAK1 and JAK2 activation participate in IL-5-induced up-regulation of c-Myc. J. Cell. Biochem. 106: 929-936, 2009.