Immunodulation and proviral action of chicken Suppressor of Cytokine Signaling 1 (SOCS1)

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We conducted microarray analysis of the increasingly popular chicken DF-1 cell line and its primary progenitor, chicken embryo fibroblast cells (CEF), in both normal and stimulated conditions using recombinant chicken IFN-α and the CEF-adapted infectious bursal disease virus vaccine strain PBG98. We found that DF-1 cells have an attenuated innate immune response compared to CEF, and also that chicken SOCS1 (ChSOCS1), a negative regulator of cytokine signaling, is expressed at levels 13-fold higher in DF-1 cells than in CEF. We found that overexpressing ChSOCS1 in CEF reduced levels of phosphorylated STAT1 protein in response to viral infection but that its "SOCS box protein" domain (which, in mammalian SOCS1, interacts with an E3 ubiquitin ligase complex) is not essential for the inhibition of cytokine-induced JAK/STAT signaling activation in DF-1 cells. Overexpression of SOCS1 in DF-1 cells led to a significant relative decrease in expression of IFN-β, MX1, IFIT5 and MDA5 in response to PBG98 infection, and increased viral yield. Conversely, knockdown of SOCS1 increased ISG induction and reduced viral yield in IFN-stimulated DF-1 cells. Our results show that, like its mammalian counterpart, ChSOCS1 reduces induction of the IFN signaling pathway.