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GENOMIC ANALYSIS OF CD56^{BRIGHT} AND CD56^{DIM} NATURAL KILLER CELLS

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Natural killer (NK) cells are a vital part of the innate immune system, playing a role in early response to infection through their ability to produce cytokines and lyse cells. NK cells have been shown to be composed of two subtypes: CD56^{dim} cells are found in the blood and are strongly cytotoxic while CD56^{bright} cells are localized to lymphoid tissues and secrete inflammatory cytokines.

A debate exists over the developmental relationship between CD56^{bright} and CD56^{dim} cells: one model proposes that CD56^{bright} cells are a precursor of differentiated CD56^{dim} cells, but another proposes they differentiate independently from a common progenitor and may interchange. To gain a better understanding of these NK cell subtypes, we profiled the transcriptome of several innate lymphocytes. We used these data to identify genes differentially expressed between the two NK cell subtypes and determined that CD56^{bright} cells have an expression profile that resembles immature NK cells. By using uniquely expressed genes to profile the different NK cell subtypes, we learned more about how they interact with each other providing information about their function in early immune responses. In addition, ATAC-seq data identifying regulatory elements located within open chromatin and CHIP-seq data identifying regulatory elements that are H3k27 acetylated were generated. This chromatin state information was used to profile genes in NK cells as poised, active, or off; giving insight as to how restricted the expression in each subtype is, providing further evidence to determine their lineage.

An understanding of the differences between NK cell subtypes and their relationships can provide insight to the development and function of the innate immune system. The differences between CD56^{bright} and CD56^{dim} cells may be essential to an effective NK cell response and their failure to function properly could result in a weakened immune system that is unable to fend off pathogens.