

MicroRNA-31 Regulates Neutrophil Migration and Activation

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Neutrophils are white blood cells involved in the innate immune response. They are the most abundant white blood cell in circulation and are involved in fighting infections as well as initiating inflammatory immune responses and contribute to certain autoimmune diseases. Therefore, regulation of neutrophil activity is crucial in maintaining homeostasis in the immune system. Yet the specific mechanisms or which molecules are involved in regulating neutrophil functions are still not fully understood. Previous studies in our lab discovered microRNA-31 (miR-31) neutrophil motility in zebrafish. In this study we propose to validate the function of miR-31 in human and uncover the underlying molecular mechanism. We propose to discover key target genes of miR-31 that are important in regulating neutrophil migration. Through a small-scale genetic screen using the neutrophil-specific CRISPR/Cas9-based gene inactivation technique, I identified a specific target gene of miR-31, *efnb2b*, involved in regulating neutrophil motility. *Efnb2b* is a ligand for Eph receptors important for heart morphogenesis and angiogenesis via regulation of cell adhesion and cell migration but not characterized in the immune system. We propose to understand the signaling pathway regulated by *efnb2* in neutrophils. Completion of the proposed study will advance our understanding of neutrophils and innate immunity, leading to possible therapeutic developments for neutrophil-related diseases.