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Autophagy in hematopoiesis

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Autophagy, unique cytoplasmic metabolic machinery involving lysosomal degradation, is required for hematopoietic stem cell multi-lineage differentiation that protects against leukemogenesis, but the underlying mechanism is unknown. Using a conditional mouse model and human leukemic primary cells as well as premature hematopoietic cell models, we uncovered a mechanistic link between autophagy and hematopoietic stem cell differentiation. Physiological autophagy activity was found to be inversely correlated with Notch signaling during hematopoietic stem cell differentiation whilst pathologically low autophagy activity was associated with up-regulated Notch signaling in dysfunctional hematopoietic stem cells of leukemia patients. Furthermore, we show that autophagy directly degrades intracellular Notch whereas conditional autophagy defects lead to elevated intracellular Notch and its downstream targets as well as failed hematopoietic stem cell differentiation. Hematopoietic stem cell differentiation potential, however, was restored in an autophagy defective system when Notch signaling was pharmacologically or genetically abrogated. Finally, we identified mitochondrial reactive oxygen species as an upstream trigger for autophagy to down-regulate Notch signaling and drive hematopoietic stem cell differentiation. Hence, in the cause of development when mitochondrial ROS are progressively produced, autophagy is triggered by the ROS to target Notch signaling to sustain hematopoietic stem cell differentiation. Autophagy dysfunction is attributed to the differentiation blockades which are often the cause of hematological malignancies. Therefore, our present findings provide a critical insight into the current mechanistic understanding of physiological and pathological connections between autophagy and hematopoietic stem cell differentiation, thereby proposing a novel mechanism by which autophagy maintains hematopoiesis and protects against leukemogenesis.

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The effect of Taraxacum officinale hydro alcoholic extract on blood cells in mice

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Taraxacum officinale, the common dandelion is herbaceous perennial plant of the family Asteraceae. Dandelion has both medicinal and culinary uses. Dandelion has been used as remedy for anemia; purify the blood and immune modulation. Therefore the aim of this study was to investigate the effect of hydro alcoholic extract on blood cells in mice. Five groups each including ten adult female (Balb/C) mice weighing 30±5 g was chosen. Normal saline was administered as placebo for group and dandelion hydro alcoholic extract in doses of 50, 100, 200 mg/kg was injected intraperitoneally for 20 days o test groups and the last group was control group. WBC, RBC, HB, HCT, Platelet and other cells were measured with automated cell counter. The number of RBC and the rate of HB in three doses of 50, 100 and 200 mg/kg significantly increased ($p<0.05$). As compared with control group, the number of WBC in three doses of 50, 100 and 200 mg/kg increased but it was significantly in 200 mg/kg dandelion treated group as compared with control group ($p<0.05$). The rate of platelet in three doses of 50, 100 and 200 mg/kg significantly decreased as compared with control group ($p<0.01$). The study indicates efficacy of dandelion extract on RBC and HB in doses of 50, 100, 200 mg/kg and in 200 mg/kg on WBC to achieve normal body balance.

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