



MINI-REVIEW ARTICLE

SMYD2 in Leukemia: An Update

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Abstract

SMYD2 is one of the five members (SMYD1-5) of the Su(Var)3-9, Enhancer-of-zeste and Trithorax (SET) and Myeloid, Nervy, and DEAF-1 (MYND) domain-containing (SMYD) protein family and is known to methylate histone and non-histone substrates. By methylating a wide range of targets, SMYD2 acts as an oncogene in most cancer types.

In this review I will comment on the last publications related to the role of SMYD2 in leukemia and I will refer to more extensive reviews if the reader aims to have a broader picture of the state of the art.

SMYD2 Promotes Leukemia Progression

Remarkably, SMYD2 is not only involved in leukemia, but also normal lineage differentiation of hematopoietic stem cells, since mice lacking SMYD2 specifically in hematopoietic stem cells displayed aberrant lymphocyte development. Regarding leukemia, these SMYD2 knock-out mice had a high rate of apoptosis and showed loss of anchorage-independent transformation of leukemia cells [1]. In line with these observations, the authors detected overexpression of *SMYD2* in many types of human leukemia [1]. Even residual expression of SMYD2 (and SMYD3) can promote chronic lymphocytic leukemia, probably due to the acquisition of complex karyotype [2].

Zipin-Roitman, et al. observed that decreased expression of SMYD2 leads to overexpression of SET7/9, indicating some kind of interplay between these two methyl transferases, that results in higher resistance to DNA damage of leukemia cells [3]. In addition, SMYD2 seemed to be downstream of MYC in acute myeloid leukemia [4].

With respect to pediatric leukemia, clinical studies indicate that upregulation of SMYD2 mRNA levels is associated with poor prognosis (i.e. higher white blood cell count, lower overall and event-free survival, among other parameters analyzed) in pediatric B lineage acute lymphoblastic leukemia, whereas SMYD2 expression was downregulated after remission of the disease [5]. Similar results were obtained by Sakamoto, et al. in the same pediatric disease [6].

Conclusions and Further Directions

Despite that the relationship between SMYD2 and tumorigenesis has been widely studied [7] and specific SMYD2 inhibitors exist (although they are not yet used in the clinics) [8], further studies are needed to elucidate its role in leukemia, as well as in other aspects of immunology [9].

References

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