Exploring Experimental Hematology: March 2019 (Volume 71)

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Exploring Experimental Hematology: Induced Pluripotent Stem Cell Modeling of Malignant Hematopoiesis

My reason for reading this review:
Disease modeling provides important first steps to understand disease pathology and underlying mechanisms that inform ways to eventually discover therapeutic interventions. Genetic animal models have served this purpose in many ways but they also have various limitations. Some of these major concerns include the different physiology between humans and other animals and the fact that some of these models cannot fully recapitulate human disease progression. To overcome these issues, one way to learn from individual patients involves the generation of iPSCs derived from primary samples with genome editing techniques to enable patient-specific mechanistic studies and drug screening. This review summarizes where we are now, what we have learned so far, and future directions for patient derived iPSC modeling of hematopoietic malignancies.

What to expect in this review:
Mark Chao and Ravindra Majeti provide an excellent summary of currently generated patient derived iPSCs from various hematological malignancies to date, the reprogramming methods used, and the functional results both in vitro and in vivo. The authors also describe several biological insights learned from being able to tease out various contributions of genetic versus epigenetic alterations, the unique advantages for modeling clonal dynamics using this technology, and clinical applications of establishing novel screening platforms using patient derived iPSCs. Finally, they discuss current technical challenges and limitations and present directions for utilizing this system in the future.

Reasons you should read this review:
This review provides a very comprehensive and up-to-date summary of patient derived iPSC research from diverse hematological malignancies. If you want to quickly learn where the

field stands and start exploring patient derived iPSCs for disease modeling, this review gives you a solid background and a great snapshot of what to expect and where to go.

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In this issue of Simply Blood, Yoon-A Kang is exploring *Experimental Hematology* by highlighting and deconstructing one of her favorite manuscripts from the ISEH society journal: "*Induced Pluripotent Stem Cell Modeling of Malignant Hematopoiesis*"

The discovery of a means to induce cellular pluripotency by introducing four transcription factors (Sox2, Klf4, Oct3/4 and c-Myc) (Takahashi et al., 2007) has heralded a global scientific re-thinking of genetics and epigenetics among developmental processes and disease. A decade later, induced pluripotent stem cells (iPSCs) with genome editing technology have now opened doors to help answer questions previously limited in the past. Here is a sneak preview of an excellent review where Mark Chao and Ravindra Majeti cover this line of work and more: