

ABSTRACT

Hematopoiesis is a precisely regulated process, dependent on the activity of hematopoietic cytokines and their receptors. Due to an extra round of whole genome duplication in teleost fish, two paralogs of many important genes, including some hematopoietic cytokines and their receptors, are present in the zebrafish (*Danio rerio*) genome. In this project, we have been investigating the role of zebrafish Kit ligands in hematopoiesis. Kit ligand is a pleiotropic cytokine, which is essential for vertebrate erythropoiesis; however, in zebrafish, no such role has been reported so far. To determine the function of zebrafish paralogs of Kit ligand (Kitlga and Kitlgb) in hematopoiesis, we performed *in vivo* and *ex vivo* gain- and loss-of-function experiments. Strikingly, we were the first to report the synergistic cooperation of zebrafish Kitlga with erythropoietin and dexamethasone, enabling the growth of kidney marrow-derived suspension cells and providing optimal conditions for the expansion of adult erythroid progenitors. We assume that by using different cytokine combinations, optimal conditions for the growth of other hematopoietic cell types can be established, and therefore, this new approach now available for the zebrafish model will be particularly useful for studies of normal and aberrant hematopoiesis (e.g. using hematopoietic mutant lines and disease models). Finally, we developed an intuitive fish tracking database system, Zebrabase, and we are providing it as a hosted service to the zebrafish community. Zebrabase is currently used in more than 40 zebrafish facilities worldwide and is continuously gaining popularity as a tracking solution of choice for both small and large facilities. Taken together, the results of this project reinforce the role of zebrafish as a relevant model for human hematopoiesis.