Abstract

Danio rerio (zebrafish) and *Oryzias latipes* (medaka) have recently become popular model organisms to study hematopoiesis. These model organisms present several advantages in comparison to other commonly used models, the most common being *Mus musculus* (mouse). The advantages are shorter generation time, large offspring production, frequent spawning, external fertilization and development, the optical transparency of embryos amenable to genetic manipulation on the background of vast numbers of transgenic lines (mainly in zebrafish) and inbred strains (in medaka).

Moreover, most of the mechanisms behind zebrafish and medaka hematopoiesis are conserved in higher vertebrates. Most importantly, the optical transparency in early development and in adult mutant transparent strains allows for observation of hematopoietic stem cell (HSC) development *in vivo*. Therefore, it is possible to generate humanized fish using xenotransplanted human HSCs for studies of the engraftment, differentiation, and trafficking of human HSC *in vivo*. Currently, the most popular organism for human HSC xenotransplantation is mice. This model system is not suitable for *in vivo* imaging of HSC engraftment. Moreover, a prior immunodepletion step is necessary. The process of immunodepletion includes genetic manipulation or irradiation of mice. On the contrary, a common strategy in danio and medaka is an early transplantation process happening before the onset of adaptive immunity. Full immune competency proceeds around 4-6 weeks post fertilization (danio) avoiding the need for immunodepletion.