

# Surrogate production of fish by germ cell transplantation

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## **ABSTRACT:**

Surrogate broodstock technology consists of producing donor-derived gametes in a surrogate fish (recipient individual) by transplanting germ cells of a donor into a recipient of a different strain or species. This technology can be facilitated by the transplantation of a cell suspension from the embryonic gonads containing primordial germ cells (PGCs), testis or ovary containing germline stem cells into larvae immediately after hatching or sexually competent adults. The following applications of this technology are expected in the field of aquaculture: (1) production of gametes of large-bodied, commercially valuable species (e.g. tunas, yellowtails, groupers) in closely related recipients with small body size and shorter generation time; (2) preservation of elite breeds of fish harboring desirable genetic traits or of endangered species, in combination with cryo-banking of donor-germ cells; (3) production of mono-sex F1 offspring by inducing sex-fate change of donor cells in recipient gonads; (4) production of fish seeds with increased genetic diversity for use in stock enhancement program to mitigate the genetic impact of released fish seeds on wild fish populations. It is expected that a combination of these techniques will greatly accelerate the breeding of aquaculture species. It is important to adapt surrogate broodstock technology to a wider range of aquaculture-targeted marine fishes and further improve the efficiency of donor-derived gamete production when using surrogate broodstock.

## **KEYWORDS:**

Germ-line stem cells; cell transplantation; gamete production.