

Fish Cell Line Repository: an enduring effort for conservation

Fish cell line has been used as one of the most promising tools in cell and molecular biotechnology research in recent days. The occurrence of disease outbreak in aquaculture, increasing magnitude of aquatic pollution and recent advances in studies on bioactive substances of aquatic origin have together sparked considerable interest among researchers to propagate fish cell culture work. Moreover, the importance of fish cell culture has been increasing as there are potential applications of fish cell lines in areas like fish pathology and immunology, toxicology, endocrinology, virology, biomedical research, biotechnology and radiation and developmental biology. Establishment of cell lines from economically important and endangered species would be of great importance for aquaculture and fisheries management¹. The fish cell line has been utilized as a rapid cost-effective and versatile tool in toxicological assessment of aquatic pollutants²⁻⁶. The model systems have been developed to demonstrate the utility of cells as sources of special adaptations and exaggerated physiological systems in epithelial ion transport, endocrinological studies, cellular stress (heat shock) response, thermo tolerance, cancer biology and environmental toxicology⁷. Recently, fish has

emerged as a suitable model and a promising alternative to the classical mammalian systems to study vertebrate development, in particular skeletogenesis. To complement *in vivo* development studies and identify signalling pathways involved in developmental processes fish cell lines have been developed, in particular bone-derived cells⁸. Recently, adult kidney stem cells have been identified in zebra fish that can generate new nephrons⁹. These cells can be transplanted from one fish to another fish, whereby they can grow into functional nephrons in the transplanted recipient. Future work is needed to determine whether fish primordial germ cells (PGCs) can give rise to stable cell cultures and retain the ability for germline transmission. Fish stem cells have the potential for use in various biotechnological works. Among them, gene targeting, germ cell transplantation and semi-cloning by nuclear transfer have attracted considerable interest and progress¹⁰. Using advanced genetic tools, key cells involved in zebra fish heart regeneration have been identified and work has begun to decipher the instructions cells use to carry out their repair work, which may have new perspective on which cells might be taught to regenerate in human heart¹¹.

The number of fish cell lines has been increasing tremendously covering a wide variety of species and tissues of origin since the development of the first permanent fish cell line, RTG-2, in 1962 from gonad tissue of rainbow trout. The development of fish cell lines has gained momentum from previous efforts at the Central Institute of Freshwater Aquaculture, Bhubaneswar in the eighties and other attempts to develop cell line from *Cirrhinus mrigala*¹², *Heteropneustes fossilis*¹³ and *Labeo rohita*¹⁴ in the early nineties. The Department of Biotechnology (DBT), Government of India has played a pivotal role in expanding fish cell culture research in the country. As a result, more than 50 fish cell lines have been developed by different research groups in India. In recent years, few embryonic stem-like cell lines have also been developed from different fish species^{15,16}.

The success story of cell line development in the country has raised the need to conserve the cell lines at one location. The National Bureau of Fish Genetic Resources (NBFGR), Lucknow has the state-of-the-art facility for development and storage of cell lines. Keeping this in view, a National Repository of Fish Cell Line (NRFC) has been established at

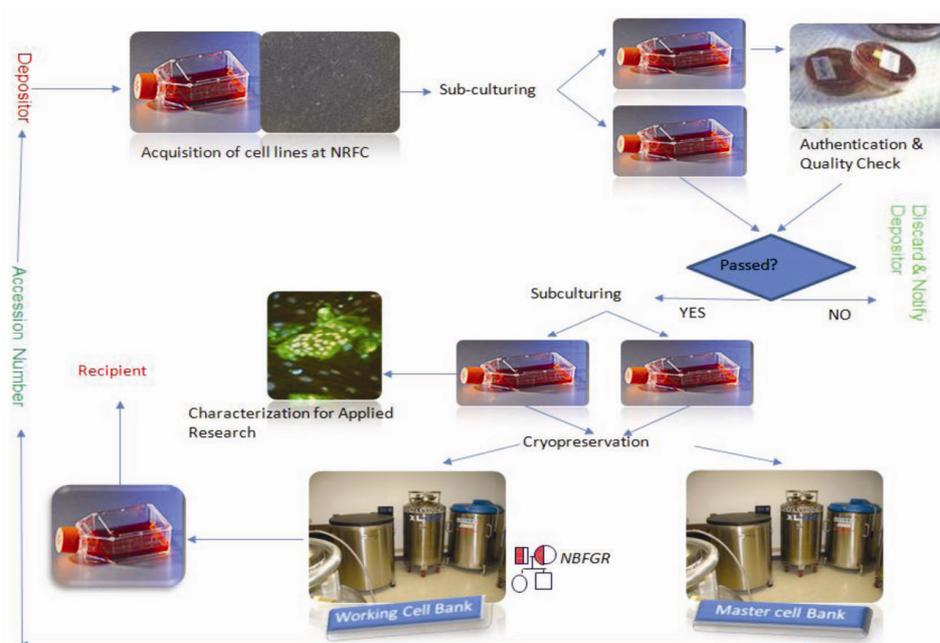


Figure 1. Graphical abstract of work plan of repository.

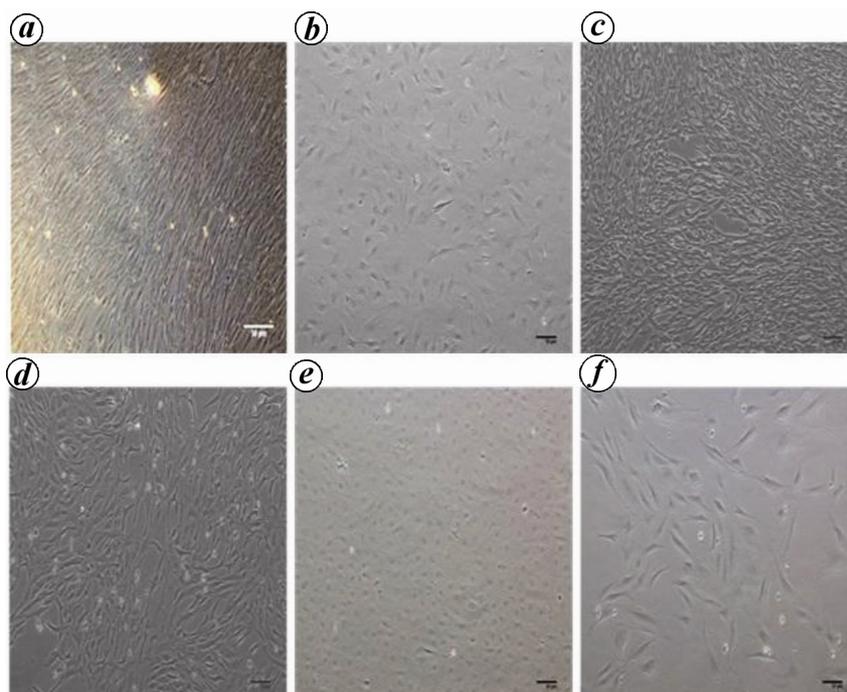


Figure 2. Photomicrographs of few important cell Lines (10X) developed from fin tissue at NBFGR, Lucknow. **a**, PCF, *Puntius chelynoides* (NRFC001); **b**, SRF, *Schizothorax rihardsonii* (NRFC002); **c**, TTCF, *Tor tor* (NRFC003); **d**, CCF, *Cyprinus carpio* (NRFC004); **e**, RF, *Labeo rohita* (NRFC006); **f**, KCF, *Koi carp- Cyprinus carpio* (NRFC007).

NBFGR with financial assistance from DBT. NRFC aims to collect, maintain and distribute fish cell lines to researchers across the country for research and development work (Figure 1). At present, 50 fish cell lines from 24 different fish species are being maintained and cryopreserved in NRFC (Figure 2). These cell lines were deposited by various research groups working on fish cell line, including researchers at NBFGR. The cell lines were authenticated and characterized using cytogenetic and molecular markers. NRFC is dedicated to provide the following services.

- Authentication (DNA barcoding, protein profiling, karyotyping).
- Sterility testing (mycoplasma, bacterial, fungal, yeast, etc.).
- Cryostorage and distribution of characterized cell line (Rs 1000 by courier and Rs 750 in person).
- Dissemination of the fish cell culture technology through training and workshop.
- Web-based information service for deposition of cell lines and request for cell lines (<http://mail.nbfg.res.in/hrfc/>).

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