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Genetically modified fish: An overview

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Abstract
Genetically modified fish are organism whose genetic material (DNA) has been altered using genetic engineering technique. The aim is to introduce a new trait to the fish which does not occur naturally in the species i.e. transgenes is. These are used in scientific research and are being developed as environmental pollutant sentinels and for use in aquaculture production. Now a days also use for commercial production, sales and consumption (1). This report provide an overview of the potential ecological and genetic effect of using genetically engineered fish in aquaculture. It reviews the recent development in gene transfer in fish and consider how genetic engineering could be used in future aquaculture.

Keywords: GM fish, technology, cisgene

Introduction

GM Fish

GM Fish is one which has genetic modification entails manipulation of DNA. This process is k/as cisgene when a gene from one species is transferred to a different species that conventionally bred or transgenes is. In case of fish there are some techniques which used for transfer of gene.

History

The first transgenic fish were produced in china in 1985 [2]. As of 2013, approx. 50 species of fish have been subjected to genetic modification, resulted in more than 400 fish/trait combination. In 2015, the aqua advantage salmon was approved by the US Food and Drug administration (FDA) for commercial production [1]. In 1986, it was estimated that the production of fish by aquaculture reached 12 million tones, which was 12% of the tonnage generated by international fishing. (FAO 1989).

Technique for gene transfer

The methodology for gene transfer to fish has been reviewed by Chourrout (1987), Chen & Power (1990), Hew & Fletcher (1992), Power *et al*, (1992) & Jiang (1993).

Microinjection – it is commonest method for introducing gene into the germ line of fishes. In mammals, the foreign DNA is microinjected in mae pronuclei of the fertilized egg. In fishes, the male pronuclear are not visible (except in Medaka) and the foreign DNA has to be microinjected into the egg cytoplasm (Powers *et al* 1992). The injection is carried out shortly after fertilization.

One method with a potential for mass gene transfer is the use of retrovirus, which can transfer DNA to hosts by viral infection and mediate transgenes is if foreign gene have been inserted into the viral genome.

Electroporation method involve the use of short electric pulse to permeabilize the cell membrane there by gaining entry of genes into the cell.

Importance

Most GM Fish are used in based research in genetics and development. Two species of fish – zebra fish and Medaka fish, are most commonly modified because they have clear chorions (shells), develop rapidly, the 1-cell embryo is easy to see and microinject with transgenic DNA

DNA and Zebra fish have the capability of regenerating their organ tissue [3]. GM Fish also used in drug discovery [4]. GM Zebra fish are being explored for benefit of unlocking human organ tissue disease and failure mysterius. Zebrafish are used to understand heart tissue repair and regeneration in efforts to study and discover cures for cardiovascular disease [5]. Transgenic rainbow trout (Oncorhynchus mykiss) have been developed by introducing gene florescence transgene to appear in fast twitch muscle fiber early in development which persist through life. It might be used as indicator or aquatic pollutant or other factor which influence development [6]. Grass carp (Ctenopharyngodon idella) have been modified with a transgene coding for human lactoferrin, which doubles their survival rate relative to control fish after exposure to Aeromonas bacteria and Grass carp haemorrhage virus. Cecropia has been used in channel Catfish to enhance their production against several pathogenic bacteria by 2-4 times [7].

GM Fish were originally created and patented for scientific research at the National university of Singapore, Texas Company, Yorktown technologies, obtained rights to market the fish as pets [8].

Conclusion

GM Fish are being engineered to increase aquaculture production and also promoted as the first marketable transgenic animals for human consumption. GM fish have been used to elaborate the research fscility in aquatic. GM Fish serve as excellent models for studies of organism and molecular evolution and that they have a large potential as experimental models system for a number of biological disciplines including genetic engineering [8]. GM Fish are used in research as enhancing the traits of commercially available fish, as bioreactor for development of bio medically important proteins, as indicator of aquatic pollutants, use for developing new non-mammalian animal models and also for studies of functional genomics [10].

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