



Effect of different waterborne copper nanoparticles level on kidney histopathology of rainbow trout (*Oncorhynchus mykiss*) fry

Bagherzadeh Lakani F. ^{1*}; Meshkini S. ²; Tehrani A.A. ³

1-Department of Fish health and disease, International Sturgeon Research Institute, Agricultural Research, Education and Extension Organization (AREEO), Rasht, Iran

2-Department of Food Hygienic and Quality Control, Faculty of Veterinary Medicine, Urmia University, Urmia

3-Department of Pathology, Faculty of Veterinary and Medicine, Urmia University, Urmia, Iran.

* Corresponding author's email: F.Bagherzadeh.L@gmail.com

Abstract:

Nanotechnology is a field of great scientific development and innovative economy that may cause environmental risks and damage to human health. Increased use of metallic nanomaterials in recent years shows the rate of release to the environment, will be accompanied by serious adverse effects in major species. Copper is an essential trace metal in small concentrations for several fish metabolic functions. Essentiality of copper arises from its specific incorporation into a variety of enzymes which play important roles in physiological processes (e.g. enzymes involved in cellular respiration, free radical defense, neurotransmitter function, connective tissue biosynthesis and other functions), as well as, into some structural proteins. Copper is also toxic in excess. In the present study totally 300 rainbow trout fry with initial weight 6.44 ± 0.37 g (Mean \pm SE) were randomly distributed in 15 fiberglass tanks (with 45 L volume and 20 L water volume) at 5 different Cu-NPs treatments with 3 replicates. Treatments included control (no added Cu-NPs), 5, 10, 20 and 40 $\mu\text{g/l}$ Cu-NPs (mean primary particle size of 2-6 nm) in a semi-static waterborne exposure regime. In order to find the histopathological changes, sampling of kidney in fish was carried out at day 10. Histological samples were dehydrated by routine methods and embedded in paraffin wax. They were sectioned by microtome and stained with H & E. Histopathologic signs such as damage to the epithelium of some renal tubules and increased Bowman's space in the kidney were the most obvious signs in the kidney of the examined fish.

Keywords: Copper, nanoparticles, kidney, rainbow trout, fry.