Pathological studies on acrylamide toxicosis in Nile tilapia

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By

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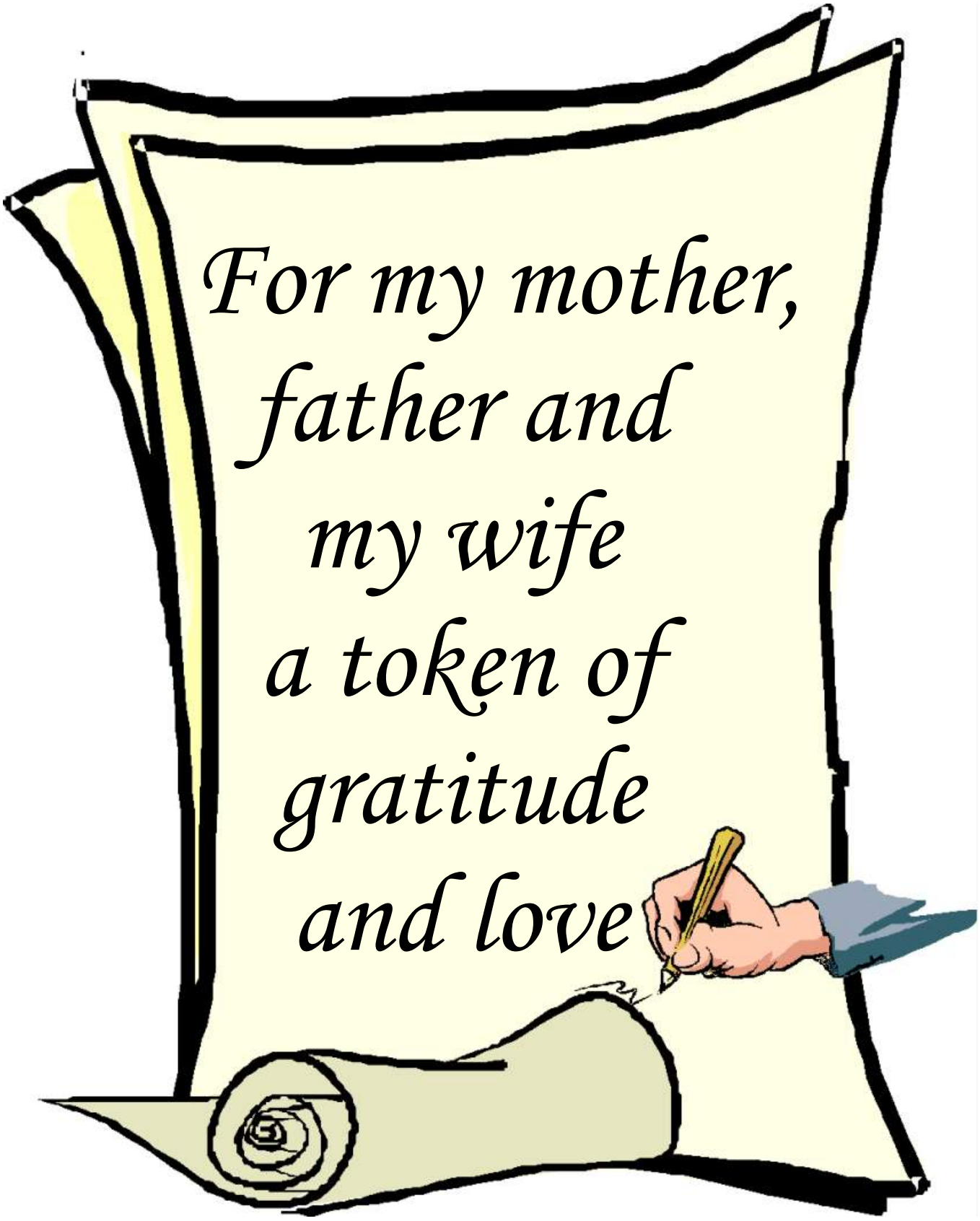
For my mother,
father and
my wife
a token of
gratitude
and love

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Firstly, the great prayerful thank to our merciful ***Allah***

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Contents

List of abbreviations

AAVal	N-(2-Carbamoylethyl) valine
ACR	Acrylamide
ALT	Alanine aminotransferase
APHA	American Public Health Association
AST	Aspartate aminotransferase
ATPase	Adenosine Triphosphatase
AUCS	Plasma-concentration time curves
BCF	Bioconcentration factor
CANP	calcium-dependent neutral proteinase
CYP2E1	Cytochrome P2E1 enzyme
CYP450	Cytochrome P450 enzyme
dl	Deciliter
EGCs	Eosinophilic granular cells
EIMS	Environmental information management system
GAP	GTPase Activating Protein
GAVal	N-(2-Carbamoylethyl) valine
GOT	glutamic oxalacetic transaminase
GPT	glutamic pyruvic transaminase
GSH	Glutathione
GST	Glutathione –S- Transeferase
IARC	International agency for research on cancer
I/P	Intraperitoneal
IUCLID	International Uniform Chemical Information Database
Kpa	Kiliopascal (pressure unit)
LC50	Half lethal concentration
MMCs	Melanomacrophage centers
MT	microtubules
NF	neurofilaments
nmol	Nanomole
P.O	Per Os
ppm	Part per million
SER	Smooth endoplasmic reticulum
t½	Half time
U.S. EPA	U.S. Environmental Protection Agency
U/l	units per litter
ug	microgram
WHO	World Health Organization

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INTRODUCTION

1-INTRODUCTION

Fish play an important source of animal protein worldwide and increasing role in solving the human nutritional problems in Egypt. The increasing in fish breeding and fish cultures considered as good way to increase the consumption rate of human need from animal protein as the per capita consumption of fish meat in Egypt is about 11Kg/year **(Gafr, 2002)**.

Nile tilapia (*Oreochromis niloticus*, L.) is one of the most widely cultured food fishes in the world (**Young and Muir, 2000).**

Acrylamide is water soluble, vinyl monomer used extensively in chemical industries and in the molecular laboratories for the production of polyacrylamide gel electrophoresis (**Gold and Schwaumburg, 2000**). Recently, ACR monomer has been found as a contaminant in certain potato-and grain based foods that cooked at high temperature (e.g., frying, grilling or baking) (**Tareke et al., 2000**).

Acrylamide is not a new chemical in our environment and has been used in various industries for decades (**Friedman, 2003**). Acrylamide is used as a binding, thickening, or flocculating agent in grout, cement, sewage, waste water treatment, pesticide formulations, cosmetics, sugar manufacturing and soil erosion prevention. The polymers of the compound are used in food packaging, plastic products (**WHO, 1985; EU, 2002 and IARC, 1994**).

Exposure to acrylamide can occur in workplaces or in the environment through air, water, land and groundwater during its production or use (**EIMS, 2002**). Exposure also occurs from cigarette smoke (**Exon, 2006**).

Acrylamide is metabolized to the glycidamide that have neurotoxic effect (**Abou-Donia et al.; 1993**) which characterized by ataxia, weight loss and nerve damage (**Gold and Schaumburg, 2000**). Acrylamide has significant carcinogenic effect and damage to the reproductive and nervous system (**Friedman et al., 1995; Tyl et al., 2000a and LoPachin et al., 2003**).

In Egypt, polyacrylamides used in agriculture for giving the soil a hydrophilic nature for increasing water retention (**El-Hady and Wahba, 2003**), conserving irrigation water and increasing the agricultural potentialities of sandy soils under the severe conditions of our deserts, i.e. the limited water resources and the inadequate water retention and low fertility of such soil (**El-Hady and Wanas, 2006**). Also, polyacrylamides are useful as flocculants in the treatment of waste water and removal of heavy metal (**El Hamshary et al., 2003**).

Defining acrylamide effects in fish and other aquatic species is of considerable importance due to waterborne residual Acrylamide from polyacrylamide preparations used or produced commercially (**Spencer and Schaumberg, 1974 and Brown et al., 1980**).

Being convinced with this idea, this study was carried out to give a spot light on the morphopathological alterations evoked by acute and chronic toxicosis of acrylamide in Nile tilapia in addition to some biochemical analysis to evaluate the hepatotoxic effect of acrylamide and study its effect on the antioxidative status.

Review of literature