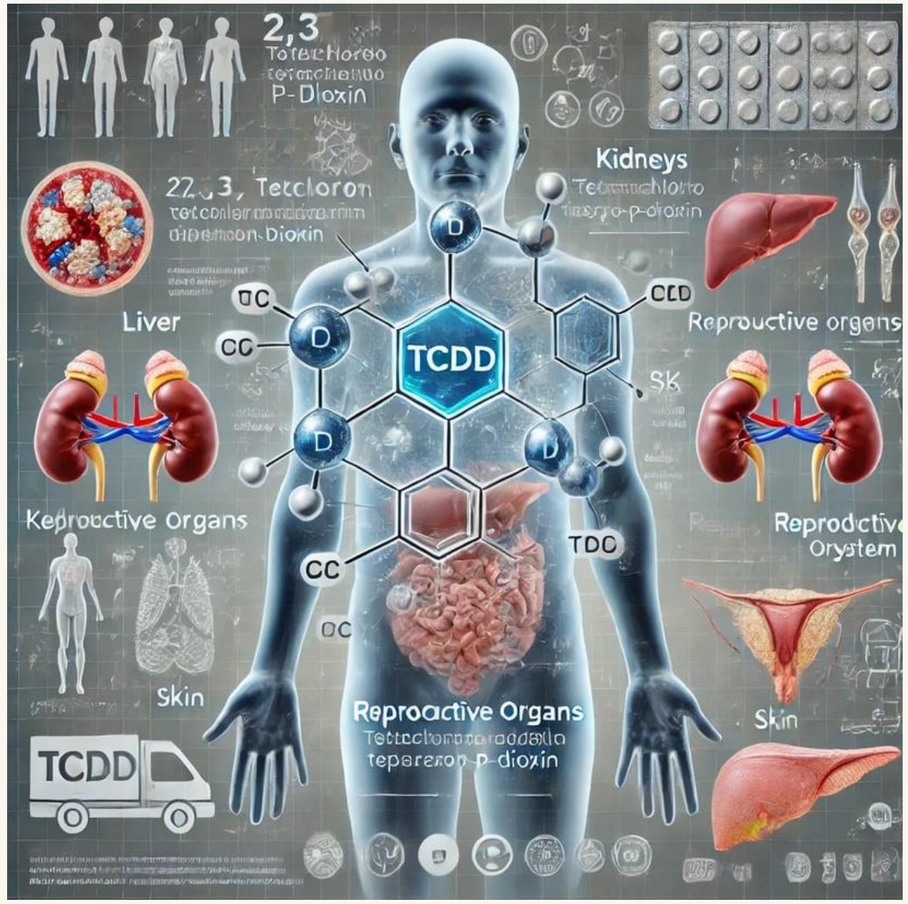
بِسْمِ ٱللَّهِ ٱلرَّحْمَٰنِ
ٱلرَّحِيمِ

يَرْفَعِ ٱللَّهُ ٱلَّذِينَ آمَنُوا مِنكُمْ وَٱلَّذِينَ أُوتُوا ٱلْعِلْمَ
دَرَجَاتٍ وَٱللَّهُ بِمَا تَعْمَلُونَ خَبِيرٌ

HISTOLOGY AND HISTOCHEMICAL IMPACT OF TCDD ON HUMAN TISSUES AND ORGANS



BY
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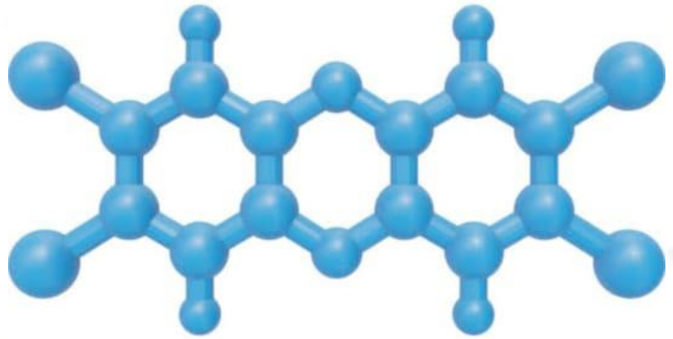
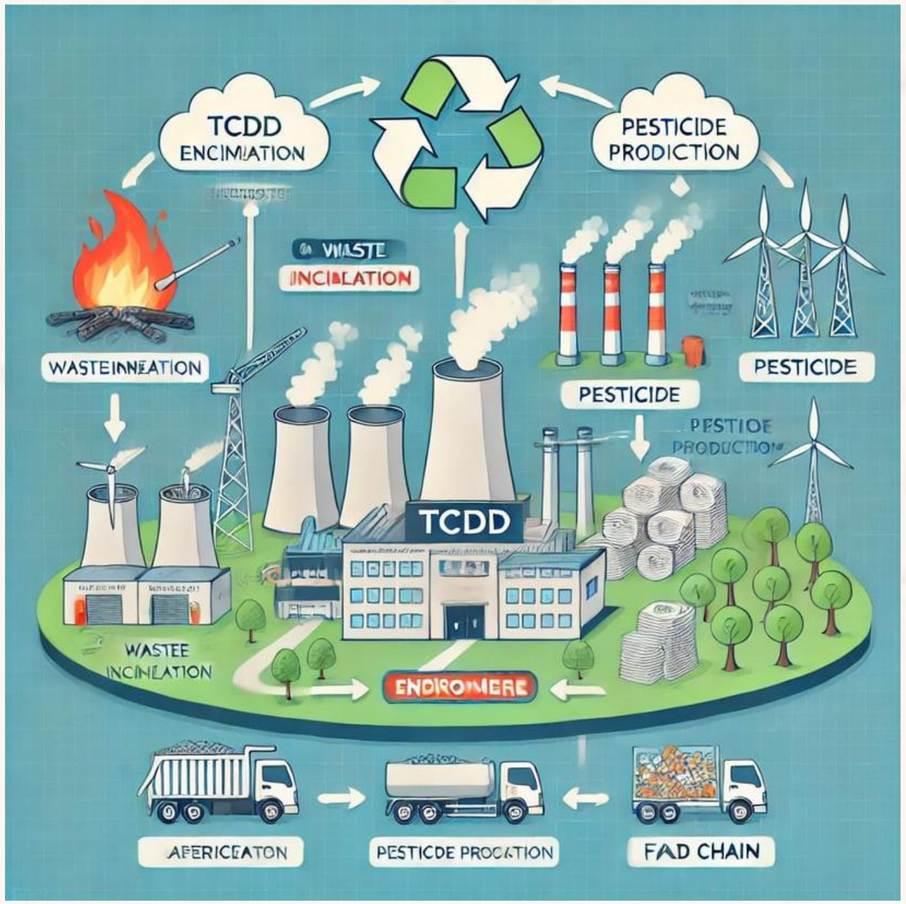
SUPERVISOR
DR/NAHED OMAR

INTRODUCTION

WHAT IS TCDD?

- TCDD is a highly toxic compound from the dioxin family,known for its environmental persistence.
- It forms as an unintended byproduct during certain industrial processes.





INTRODUCTION

SOURCES OF TCDD

- Industrial Sources: Produced during waste incineration, chlorine bleaching of paper, and pesticide production.
- Natural Sources:Can also form during forest fires and volcanic eruptions.
- Exposure Routes: Mainly through contaminated food, inhalation of polluted air, or skin contact with contaminated soil.

INTRODUCTION

TOXICITY AND HEALTH IMPACT

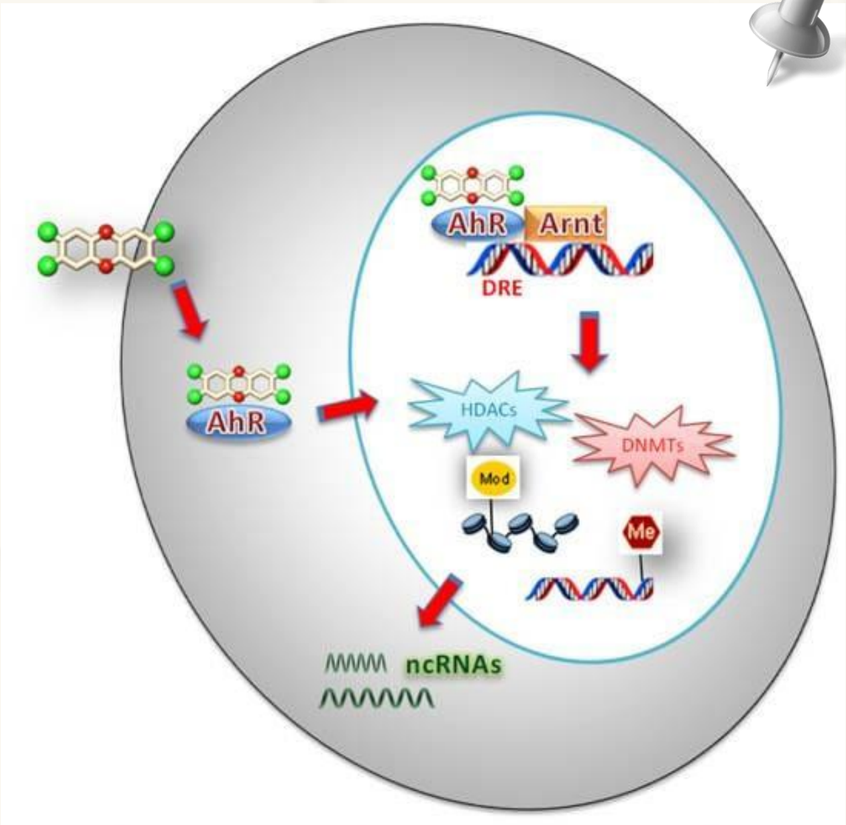
- Highly persistent in the environment and accumulates in fatty tissues.
- Carcinogenic,immunosuppressive, and toxic to the reproductive system.
- Classified by the U.S. EPA as a probable human carcinogen (Group B2).

IMPORTANCE OF THE RESEARCH:

- The research aims to understand the toxic mechanisms and health effects of TCDD

MECHANISM OF TCDD

- TCDD binds to AhR: TCDD attaches to the aryl hydrocarbon receptor (AhR) in the cytoplasm.
- Complex formation and nuclear translocation: The TCDD-AhR complex enters the nucleus.
- Gene expression alteration: The complex binds to specific DNA regions called dioxin response elements (DREs), affecting gene activity.
- Effects on cellular processes:
- Oxidative stress: Increased production of reactive oxygen species (ROS).
- Inflammation: Upregulation of pro-inflammatory proteins.
- Cell growth: Disruption of normal cell cycle and proliferation.
- Toxic outcomes: Long-term activation of AhR causes cancer, immune system damage, and reproductive issues.



EFFECTS ON REPRODUCTIVE SYSTEM

GENERAL EFFECTS:

- Disrupts estrogen function, affecting uterine growth.
- Reduces fertility in future generations by lowering ovarian follicles.

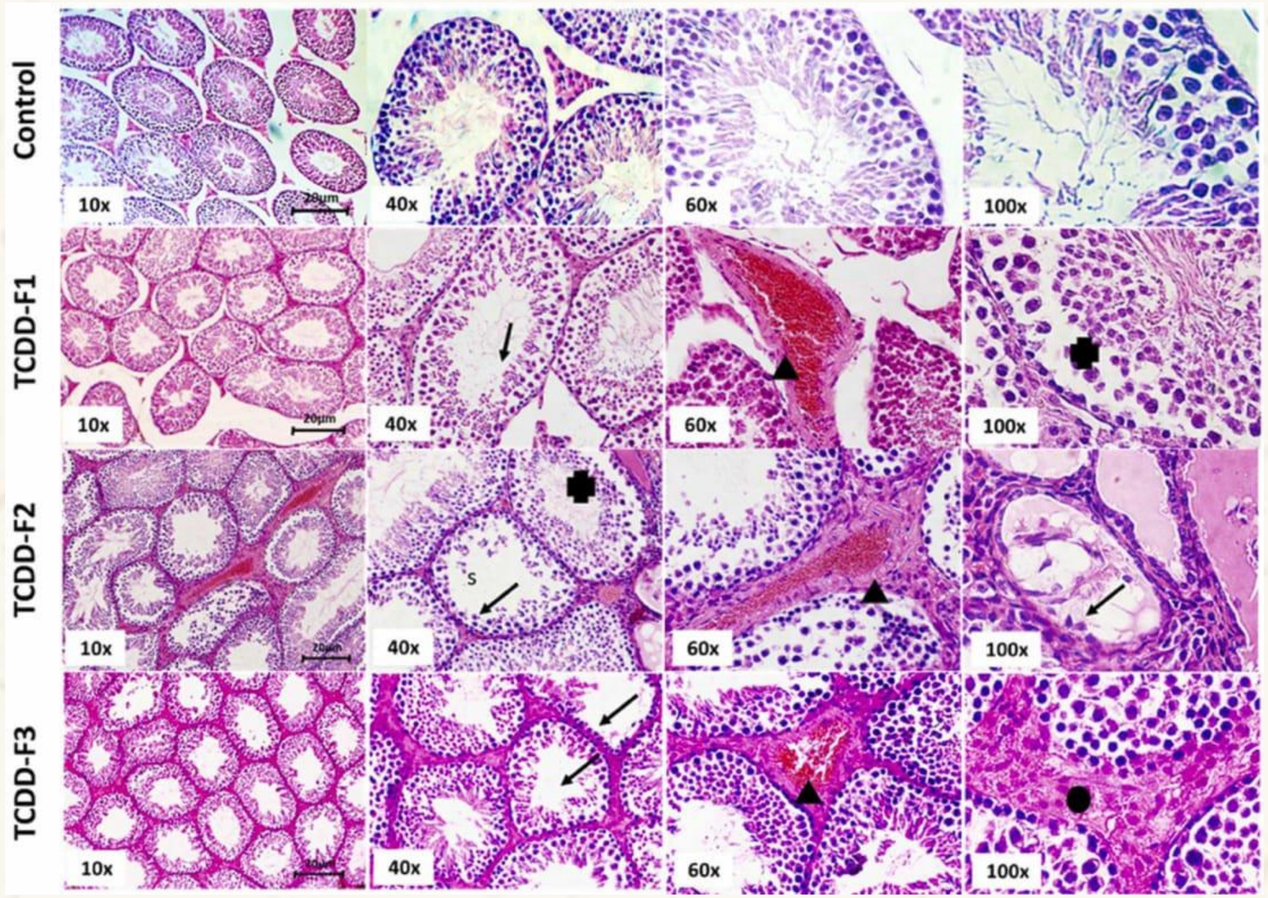
TESTES:

- Reduces sperm count and causes structural abnormalities (e.g., ectopic testes).
- Lowers testosterone levels in males.

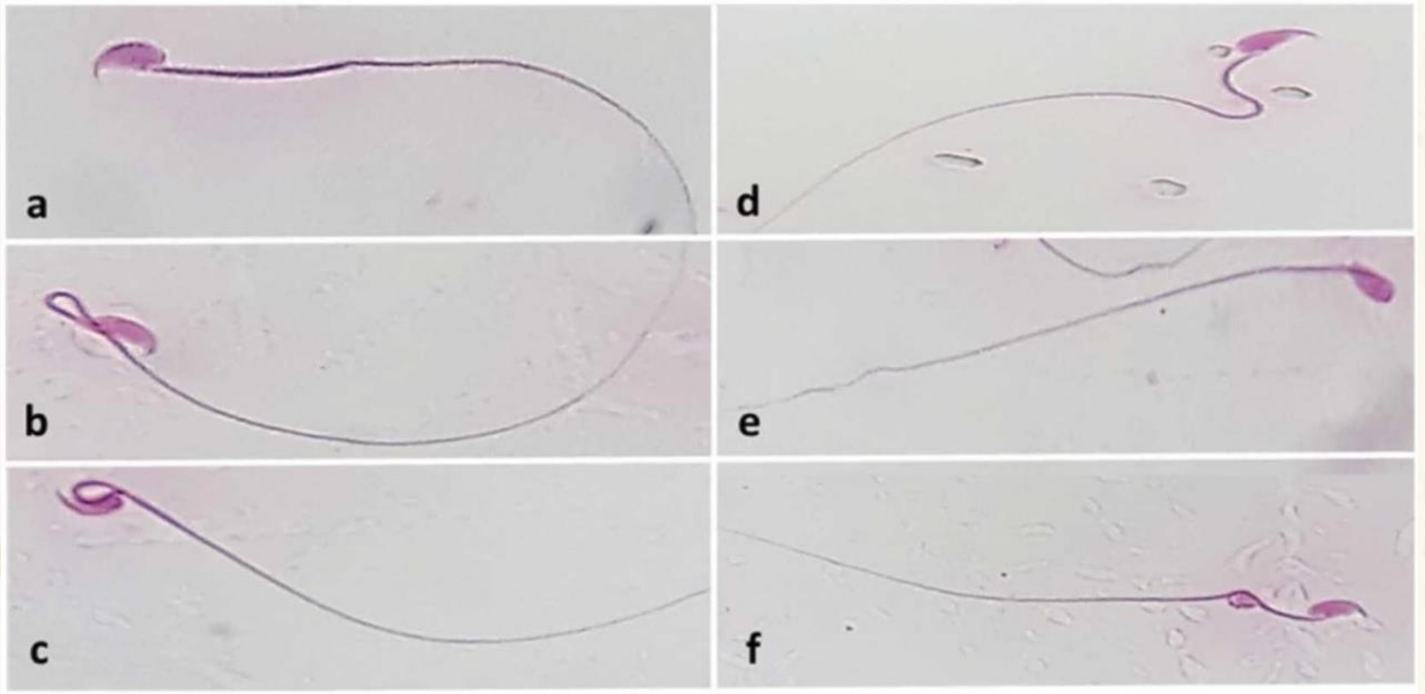
OVARY:

- Causes malformations in external genitalia.
- Increases the risk of endometriosis.

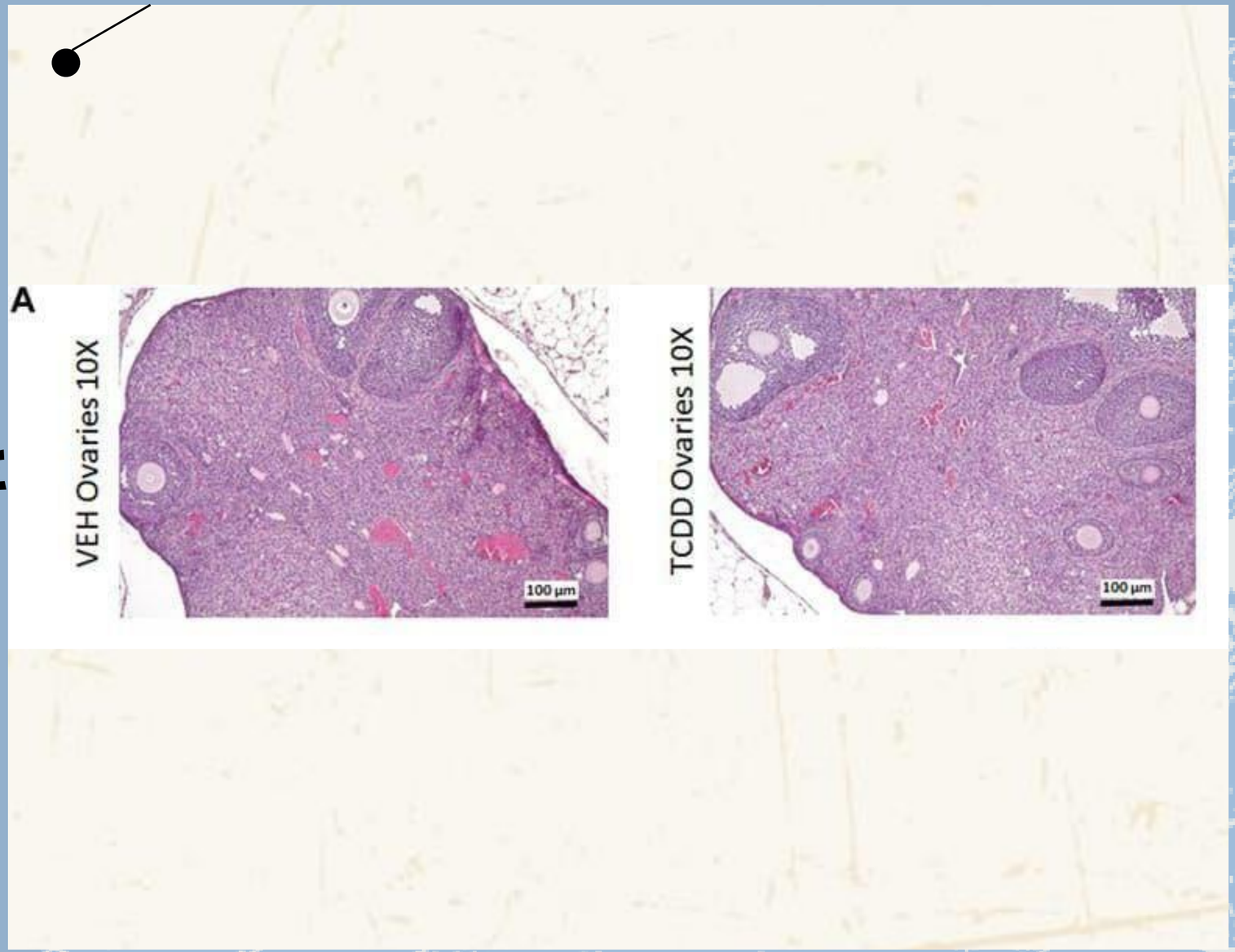
HISTOLOGICAL SECTIONS OF THE TESTIS STAINED WITH HEMATOXYLIN AND EOSIN (H+E) DEMONSTRATE THE HARMFUL EFFECTS OF TCDD ON THE STRUCTURE OF SEMINIFEROUS TUBULES, WITH EVIDENCE OF GERM CELL ATROPHY AND TISSUE HEMORRHAGE COMPARED TO THE CONTROL GROUP



THE STAINED IMAGE SHOW VARIOUS MORPHOLOGICAL ABNORMALITIES IN SPERM FOLLOWING TCDD EXPOSURE, INDICATING POTENTIAL IMPACTS ON MOTILITY AND FERTILIZATION CAPABILITY.



LM IMAGES OF H+E-STAINED OVARIAN TISSUES SHOW THAT TCDD EXPOSURE REDUCES FOLLICLE COUNT, INCREASES FIBROSIS, AND DISRUPTS OVARIAN STRUCTURE.



EFFECTS ON THE SKIN

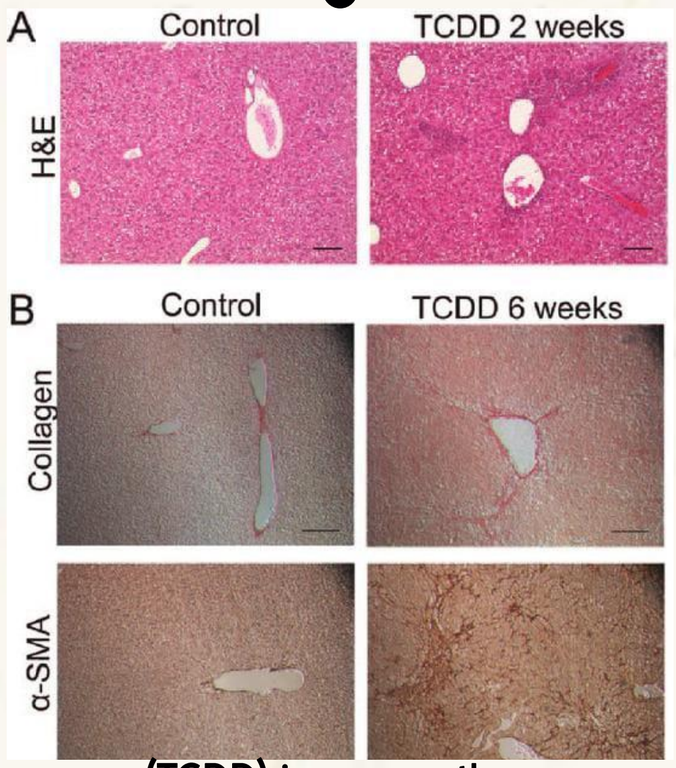
SKIN BARRIER DISRUPTION:

- Thinning of the epidermis, reducing skin protection.
- Impaired keratinocyte function, increasing vulnerability to infections.

CARCINOGENIC EFFECTS:

- Higher risk of skin cancer due to genetic damage.
- Tumor promotion by disrupting cell growth regulation.

President Viktor Yushchenko of after dioxin poisoning with 2,3,7,8-TCDD (courtesy of the Associated Press).



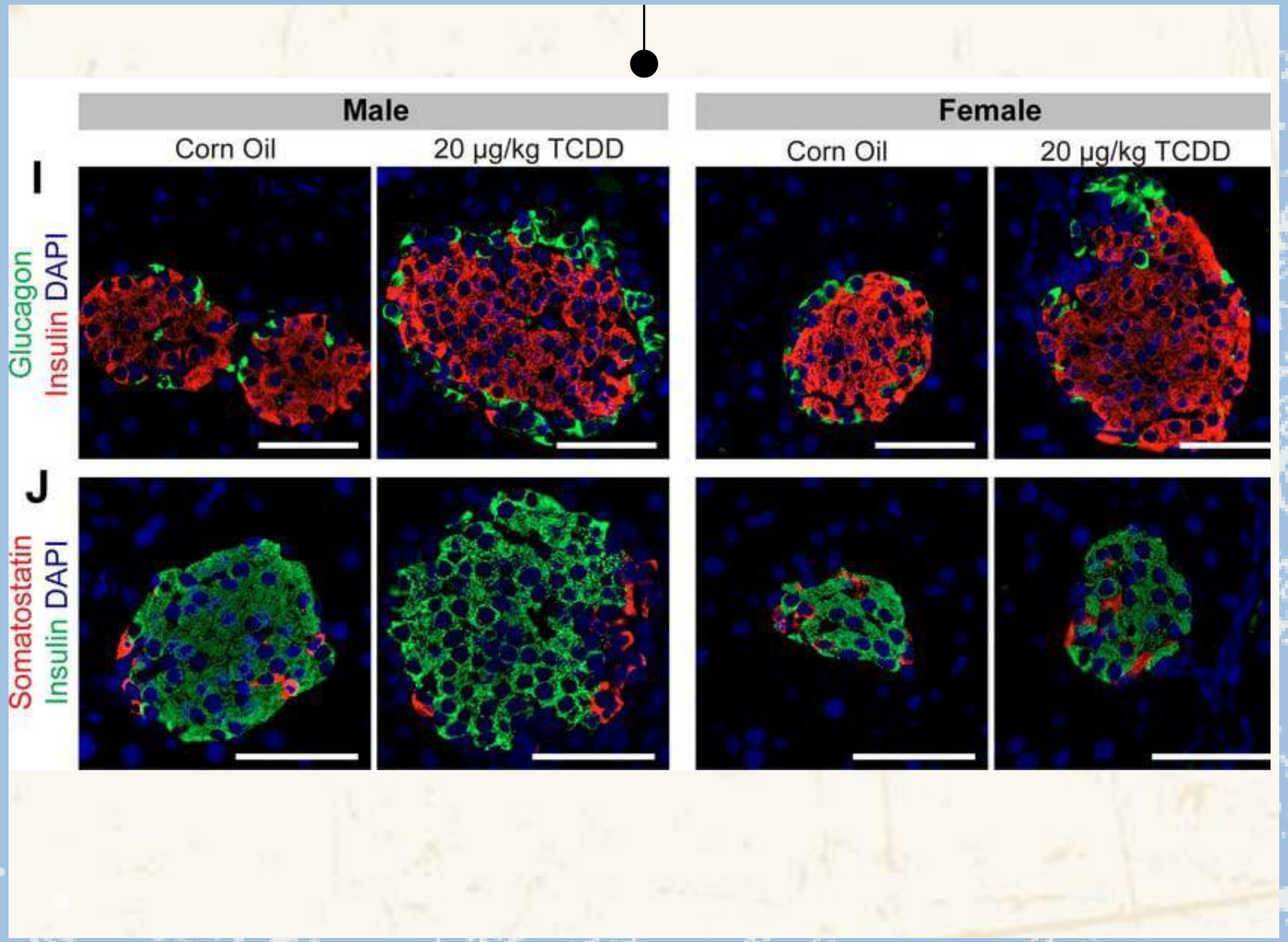
(TCDD) increases the expression of the hepatic fibrosis markers Coll1A1 and a -smooth muscle actin (a -SMA) and leads to hepatic fibrosis

EFFECTS ON LIVER

Liver Toxicity: Exposure to TCDD can cause liver damage by inducing oxidative stress, enlarging the liver, and leading to the death of liver cells. It also disrupts key enzymes that are responsible for detoxifying substances, which affects liver function.

EFFECTS ON PANCREATIC

Pancreatic Toxicity: TCDD negatively impacts the pancreas, reducing the production of essential digestive enzymes like amylase and lipase. This disruption also affects insulin signaling, which impacts glucose metabolism and digestion, leading to symptoms similar to diabetes.

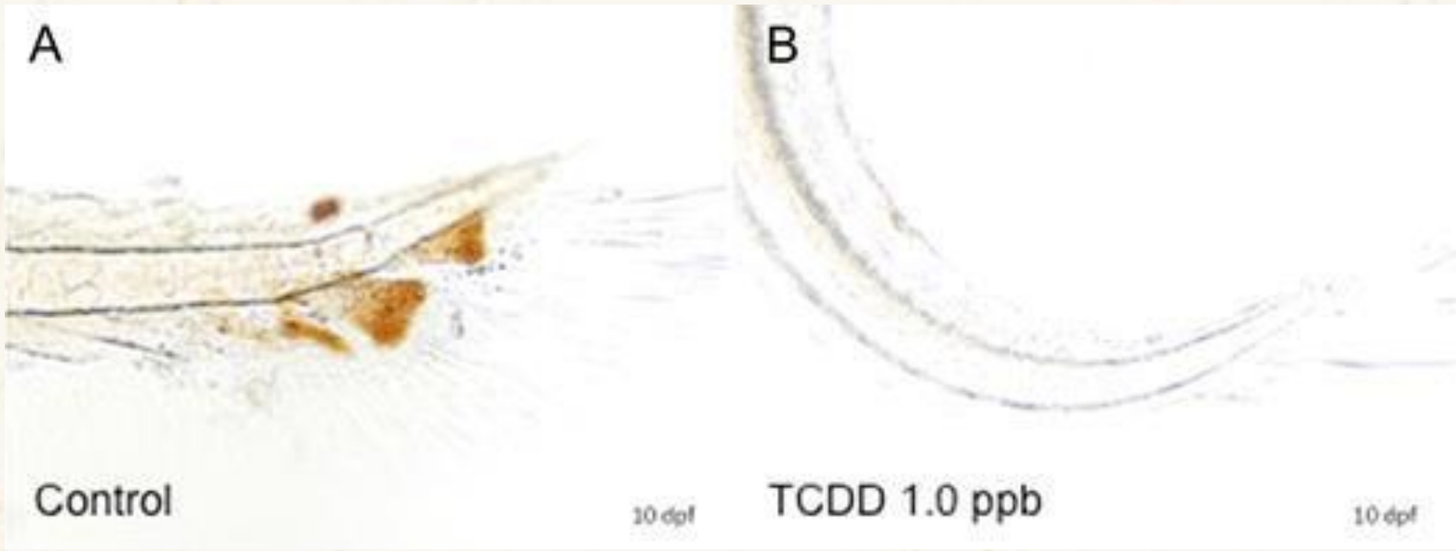


EFFECTS ON BONES

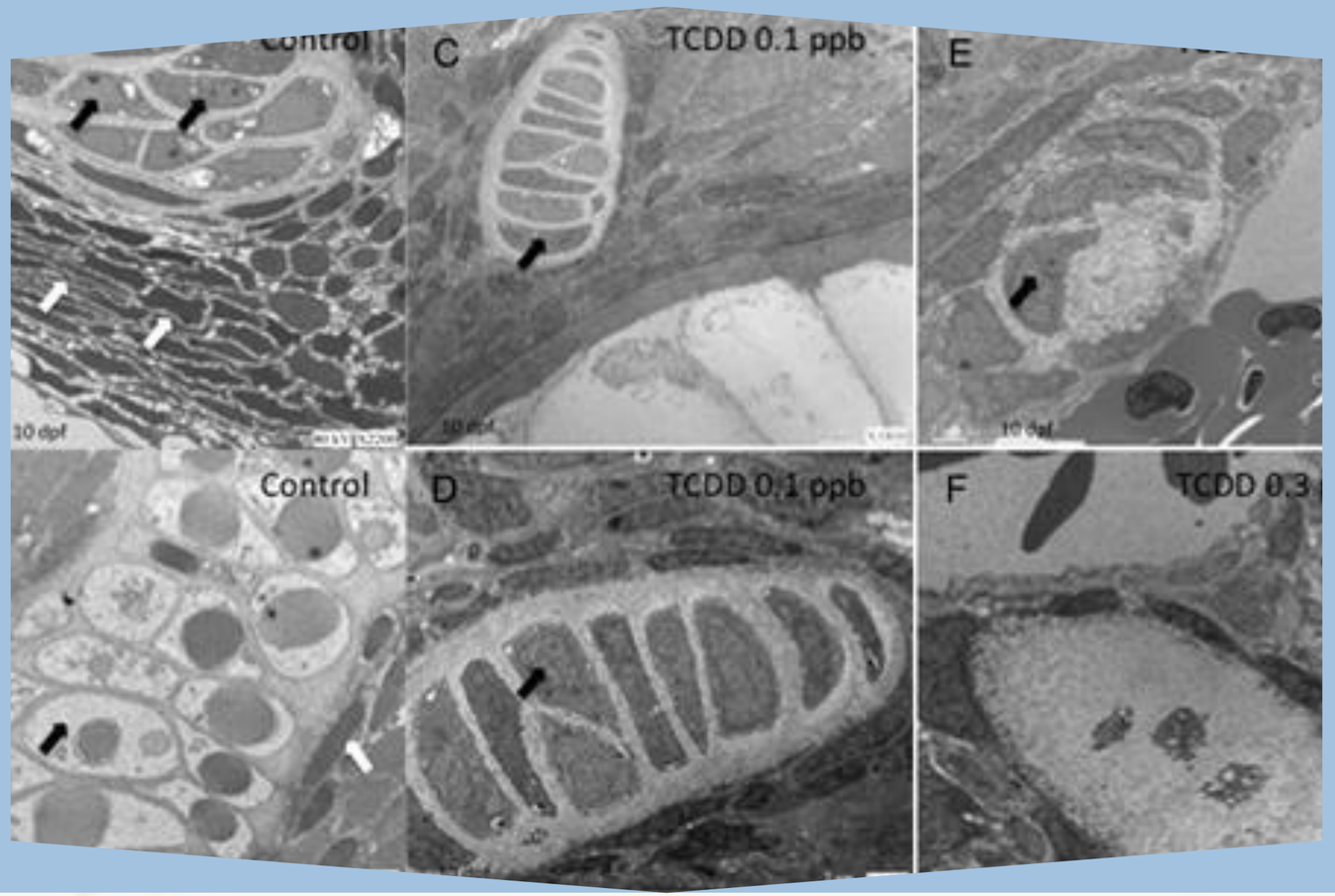
Effects of TCDD on Bone Development

- Inhibits osteoblast differentiation.
- Reduces bone mineral density.
- Delays ossification.
- Weakens bones and increases fragility.

Causes skeletal deformities (evident in zebrafish and rodents).



Effect of TCDD on expression of collagen type II (COL2a) immunoreactivity in medaka hypurals.



Electron microscopy images show progressive mitochondrial and cellular damage in response to increasing TCDD exposure, highlighting its toxic effects on cellular structures

thank you!