# Effects of Low –level Cadmium Exposure on HUVECs (Human Umbilical Vein Endothelial Cells) Cell Viability and Morphology

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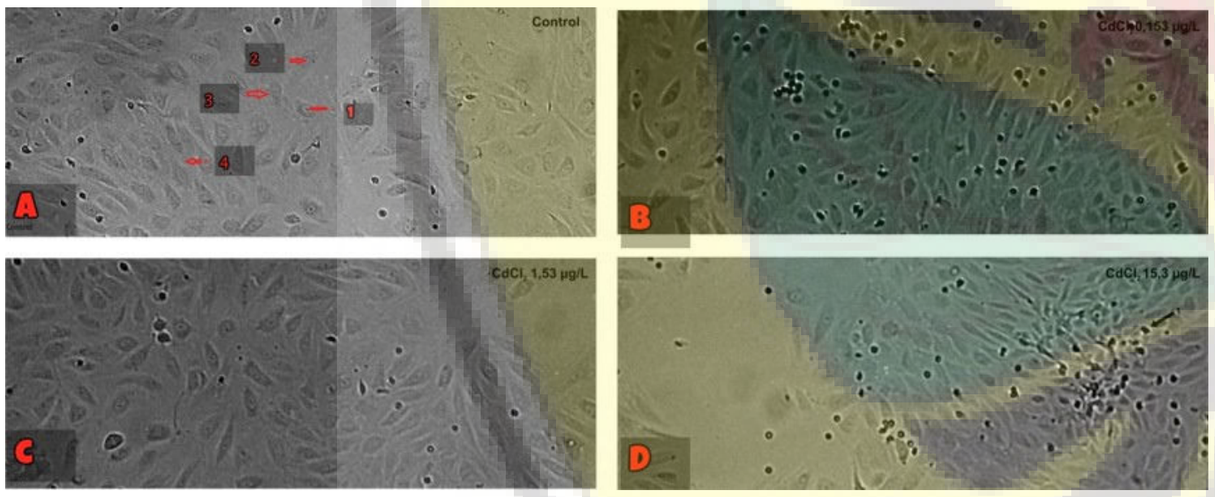
## INTRODUCTION

Cadmium is a heavy metal that could be found in daily life. This metal has a toxicity, could contaminate the environment, and affect human health. The main aim of this research was to find the effect of low concentration Cadmium exposure in acute time toward HUVECs cell morphology and viability.

## METHOD

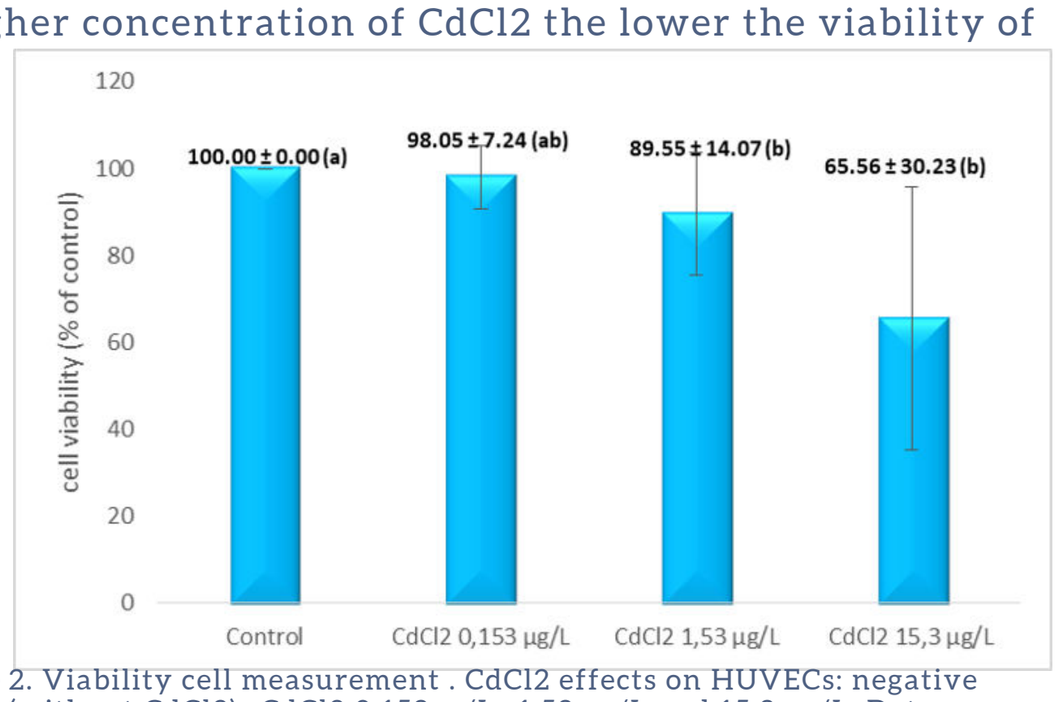
In a True experimental research with in vitro model using HUVECs cell, HUVECs cell was divided into four groups. One control group (without CdCl2 induction) and three treatment groups with CdCl2 induction with various concentrations, 0,153 µg/L, 1,53 µg/L and 15,3 µg/L. The trial was repeated five times for each group. Cell morphology was observed with an inverted microscope. Cell viability was examined by MTT assay. Data were analyzed using Kruskal Wallis statistical test and continue with the Man Whitney test. Correlation test was using Spearman.

## RESULT




Picture 1 membrane (A) Control 1.Nucleus 2.Cytoplsm 3. plasma 4. Extracellular matrix (B) CdCl2 concentration 0,153 µg/L, (C) CdCl2 concentration 1,53 µg/L, (D) CdCl2 concentration 15,3 µg/L. observation using inverted microscope (100x), without staining. Observation of culture endothelial cell exposed by CdCl2

Morphology of treatment group HUVECs cell induced by CdCl2 concentration 15,3 µg/L looked significantly different compared with control group ($p<0.05$). Cell viability on group HUVECs induced by CdCl2 15,3 µg/L significantly different compared with the control group. The correlation test resulted R= -0,665 with probability 0.001 which means the higher concentration of CdCl2 the lower the viability of cells.




Picture 2. Viability cell measurement . CdCl2 effects on HUVECs: negative control (without CdCl2), CdCl2 0,153µg/L, 1,53 µg/L and 15,3 µg/L. Data are presented as an average ± SD.($p<0.05$).CdCl2 decrease cell viability.

\ Superoxide anion (O2•−), hydrogen peroxide (H2O2), hydoxy radical (•OH) and lipid peroxides (•L) are free radicals which produced because of Cd exposure. Cd will trigger ROS with undirect mechanism due to Cd are not active metal redox so that to trigger ROS, Cd using several mechanism such as inflammation, glutation reduction, and affected iron ion through fenton reaction ROS has an important role on apoptosis by affects MAPK adjustment and inhibit foforilation ERK1/2. Cell death program could triggered by cadmium through low dose exposure during short period by affecting cellular activity, break DNA, and causes oxidative stress. There are several pathways which suggested as apoptosis pathway because of cadmium induction such as by penetrate the cell through Ca channel and increase IP3R1 regulation (inositol 1,4,5 triphosphat receptor) so that causing ion ca2+ escape from reticulum endoplasm, activates calpain, induce DNA fragmentation and apoptosis. Cd induce could trigger cytochrom C and activate caspase 9 as one of apoptosis pathway.11

On our research, HUVECS inducted by CdCl2 on 48 hours are able to reduce cell viability. This is similar with research using cell line inducted by CdCl2 concentration 2,5-15 µg/ml obtained the greater CdCl2 concentration will decrease cell line viability.

## CONCLUSION

Cadmium in low concentration induces cell morphology change and reduce cell viability.

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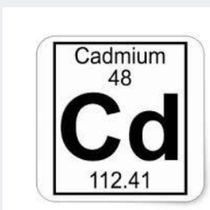


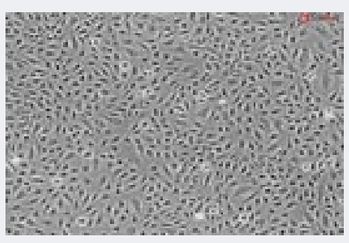

# CERTIFICATE

## OF APPRECIATION

THIS CERTIFICATE IS PROUDLY PRESENTED TO

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