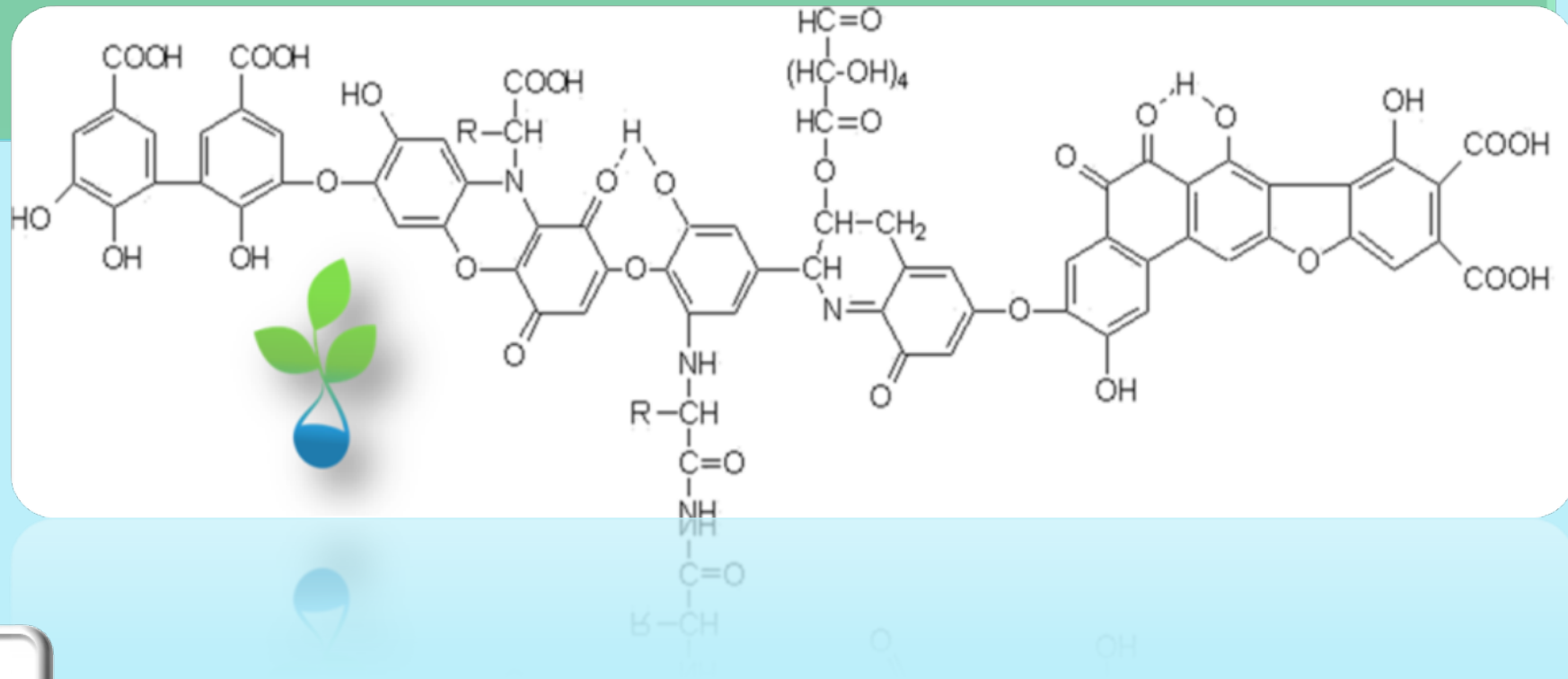


# Influence of humus water on endothelial cells under conditions of hyperglycemia.



**Katarzyna Szot**

**Krzysztof Góralczyk**

**Natalya Veryho**

**Danuta Rość**

Department of Pathophysiology,  
Nicolaus Copernicus University in  
Toruń, Collegium Medicum in  
Bydgoszcz, Poland

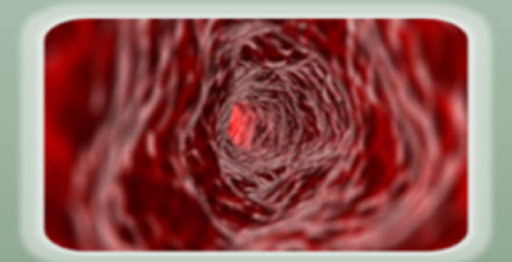
## BACKGROUND



**Hyperglycemia is the major causal factor in the development of endothelial dysfunction in diabetes mellitus**



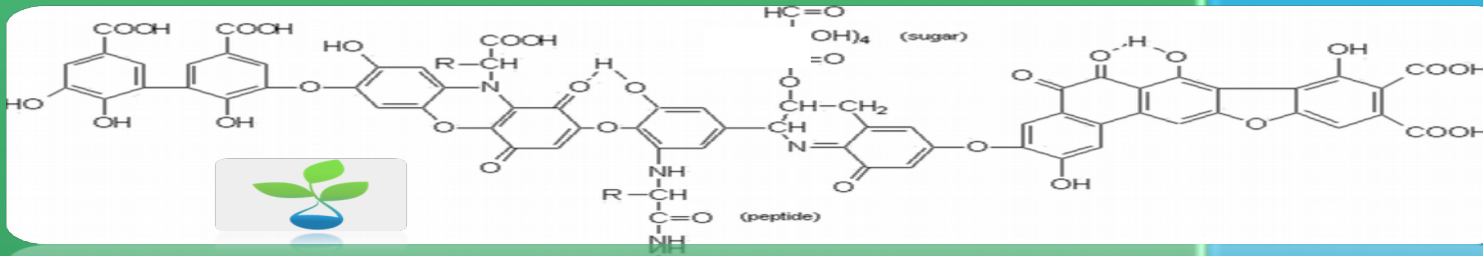
**WHO projects that diabetes will be the 7th leading cause of death in 2030**



**Endothelial cells are on the front line of contact with the high concentration of glucose**

## BACKGROUND

**Humus water are the natural organic-mineral waters from the Miocene aquifer formations. They are intensely colored extract of humus acids – so these waters can be called in another *brown waters*.**



**Due to the presence of various functional groups can actively make intramolecular and intermolecular bonds and reactions, and therefore they have high biological activity.**

## Pleiotropic therapeutic activities:

**detoxicating, anti-inflammatory,  
antioxidant, immunomodulatory,  
metabolic, hepatoprotective**

**Humus water in organism may increase the energy levels, the bioavailability is higher and they also enhance the amino acids that act as antioxidants and free radical scavengers in the body.**

**These are properties that are very important in the human body and could be the basis of metabolic management in diabetes.**

# MATERIAL & METHODS

**1 % humus  
water from  
source:  
Brączewo  
(Poland) were  
used in study.**



**Endothelium culture**

+

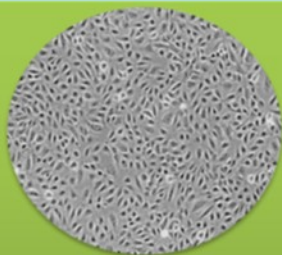


**Counting viable cells**

**CONCENTRATION (viable cells/mL)**



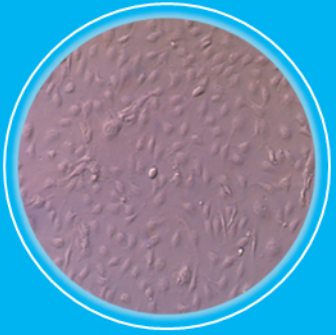
**STUDY GROUP  
+ 30 Mm/L glucose**



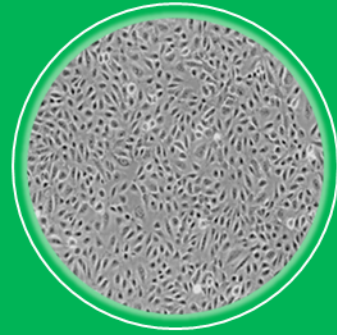
**CONTROL GROUP**

**In vitro model to mimic  
endothelial cells under  
condition of hyperglycemia**

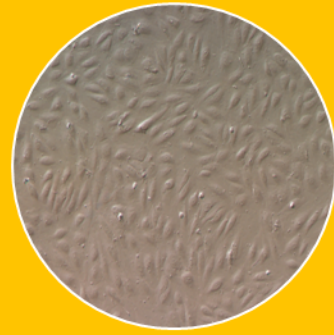
# Endothelium culture



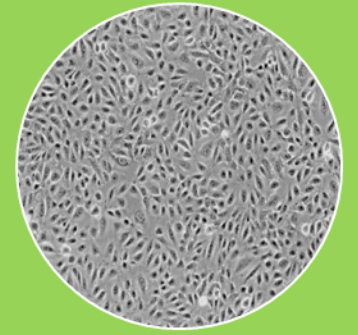
**1 CONTROL  
GROUP**



**2 GROUP**  
**+ 1% humus water**



**3 GROUP**  
**+ 30 mM/L glucose**



**4 GROUP**  
**+ 30 mM/L glucose**  
**+ 1% humus water**



# RESULTS

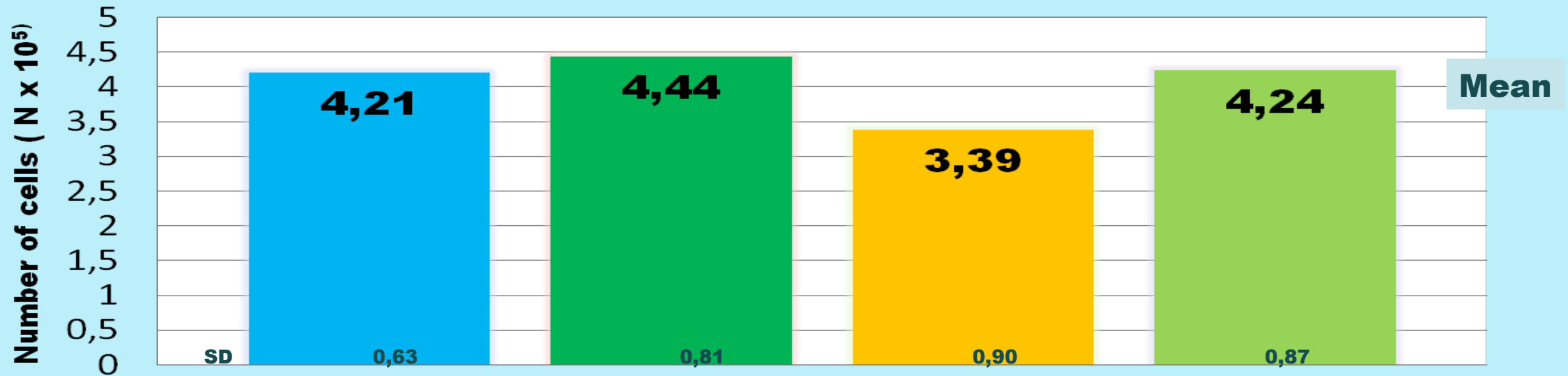
## Proliferation

**1 CONTROL  
GROUP**

**2 GROUP  
+ 1% humus water**

**3 GROUP  
+ 30 mM/L glucose**

**4 GROUP  
+ 30 mM/L glucose  
+ 1% humus water**



**P=0.0002**



# CONCLUSIONS

**The lowest number of endothelial cells cultured under hyperglycemic condition**

- Indicates the negative impact of high glucose concentration on the proliferation.
- High glucose concentration induce apoptosis and excess cell death in cultured vascular endothelial cells.

**The number of cells with glucose and humus water reached the level similar to the control group**

- It appears that the adverse effects of hyperglycemia on vascular endothelial cells may be corrected by addition of humus water.
- The impact of humus substances indicate enhance of cell proliferation.

