The Report of C.O.A water

The study for the effects of ENS water (C.O.A water) on Diabetes mouse model

- **Attached files**
  - **A. Summarizing the specific aims of the study**
  - **B. Background of Diabetes**
  - **C. Methods**
  - **D. Results**
  - **E. Conclusion**
  - **F. Further Study**

[redacted]

The Report of the C.O.A water

Research institute : Mayo Clinic (USA)

A. Summarizing the specific aims

Diabetes is a serious and potentially life-threatening disease in humans. The total number of people with Diabetes is predicted to rise from 171 million in 2000 to 366 million in 2030. According to the report of Korea Centers for Disease Control & Prevention (KCDC), the number of patients increases with age, and the rate also significantly increases every year (Fig.1).

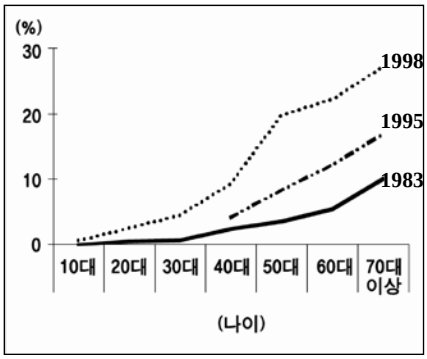


Fig. 1. The trend of diabetes by age and years *(KCDC)*

Several previous studies showed that the function of water is very important in Diabetes. However, most studies were focused on water intake. In the report of the W.H.O, water is closely related to human disease including Diabetes. Although everyone knows the importance of water, it is not clear how the water or what composition of the water works on the certain disease. Also, it is too hard to find the water-related study with actual human disease improvement and protection. **Here, we study the effects of water provided by ENS (C.O.A) on Diabetes disease models. And, we will find the specific components of water and its mechanisms that have the effect of improving the disease as our further study.** To test this hypothesis, we propose the following Specific Aims:

Aim 1. Study the effect of C.O.A water on Diabetes mouse model

Aim 2. Study the role of C.O.A water in Diabetes

B. Background

Diabetes is a disease in which there is high blood glucose (blood sugar) levels. Glucose is the main energy source from foods and Insulin helps the glucose get into the cells from blood. Usually, the pancreas releases insulin to help the body store and use the sugar and fat from the food. Therefore, Diabetes occurs with abnormal pancreatic functions such as producing very little or no insulin.

With type 1 diabetes, the body does not make insulin because of the pancreas' failure to produce it.. With type 2 diabetes, the more common type, occurred with insulin resistance (Fig.2). Without enough insulin, the glucose stays in the blood. It is the reason for why high blood sugar is the common symptom of diabetes.

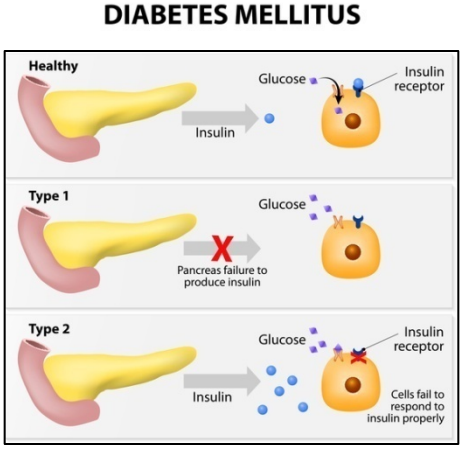
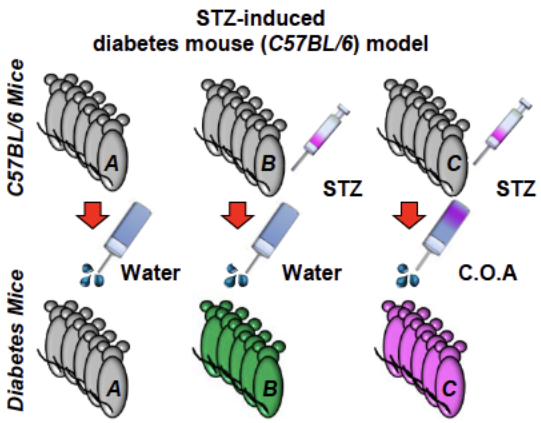


Fig. 2. Healthy pancreas and pancreas in type 1 and type 2 diabetes.
(NIH, Genetics Home Reference)

The Report of the C.O.A water

Research institute : Mayo Clinic (USA)

C. Methods



C57BL/6 (6–8 weeks old, female) mice were purchased from the Jackson Laboratory (Bar Harbor, ME, USA).
In the STZ-induced type 1 or type 2-associated diabetes mouse model, we set aside cages of sex and age-matched (3months or 12 months)-old C57BL/6 mice to be used for experimental and control groups. On day 0, mice were given a single peritoneal injection (intraperitoneally, IP) of Streptozotocin (STZ, 180 mg/kg) working solution (1 mg/ml in isotonic saline, diluted from 10 mg/ml stock solution in H2O kept at -20 °C).
One day later, Normal or C.O.A water was administered for 30 days. Body weight, blood glucose, levels of cytokines (TNF-α, IL-1β, and IL-6), and alanine aminotransferase (ALT) and aspartate aminotransferase (AST) levels were measured every five days.

D. Results

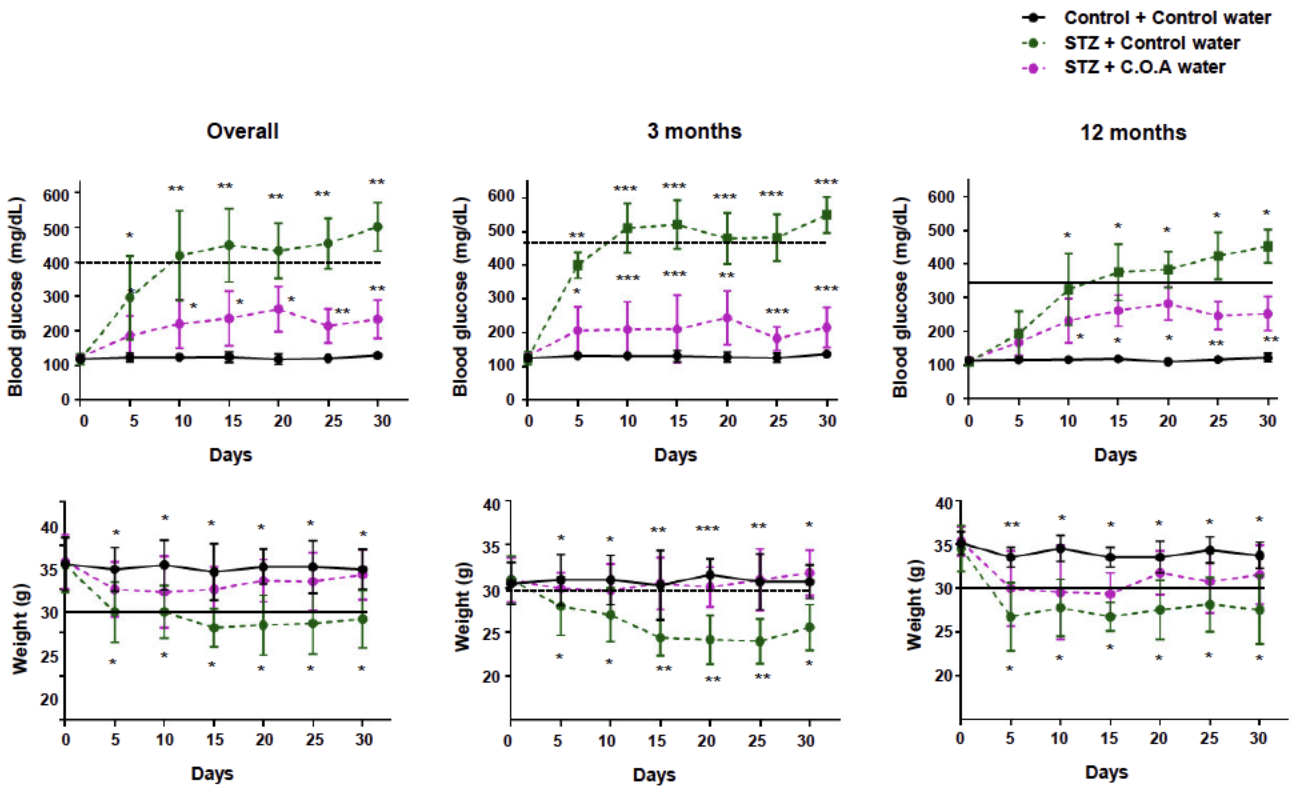


Fig. 3. Effects of C.O.A water on glucose intolerance, and body weight in a STZ-induced diabetic mouse (DM) model.

We first investigated the anti-diabetic effects of C.O.A water on STZ injection diabetic mice, well-known mouse models of diabetes. After STZ-injection, the blood sugar levels increased and mice weight decrease by STZ-induced pancreatic injury. Surprisingly, the group with C.O.A water, provided as drinking water, significantly decreased blood glucose levels (top) and recovered their weight (bottom) by STZ-injection.

The Report of the C.O.A water
Research institute : Mayo Clinic (USA)

D. Results

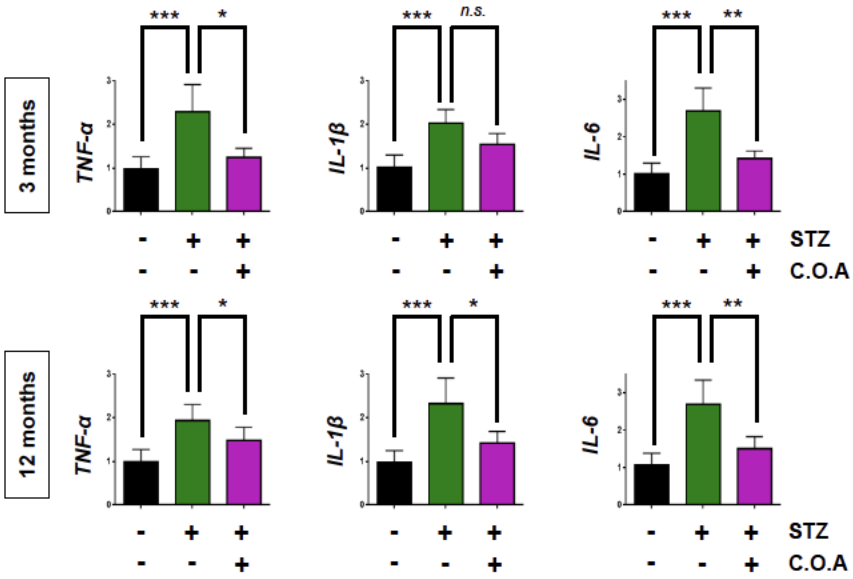


Fig. 4. Effects of C.O.A water in STZ-induced diabetic mouse (DM) model on proinflammatory cytokines.

Proinflammatory cytokines, such as IL-1β , TNF-α, and IL-6 reflects the severity of pancreas islets injury in STZ-induced diabetes mouse model. We found that C.O.A water inhibited the harmful STZ effect toward the Pancreas. Therefore, we gave the water to each of the STZ-induced diabetic mice. To determine inflammatory cytokines, IL-1β, IL-6 and TNF-α levels were measured at the end of the study. All cytokines were significantly increased in STZ-induced DB mice, compared to those from control. Interestingly, treatment with C.O.A water reduced the cytokines production.

Table 1. Effect of C.O.A. water on the activity of ALT and AST in the serum in in-diabetic, STZ-diabetic mice after 30 days.

Enzyme activity	Groups		
Serum (*IU/L*)	A (Control)	B (STZ + Control)	C (STZ + C.O.A.)
AST	107.344±14.80a	209.433±18.34a	109.344±14.79a
ALT	50.741±04.34a	139.741±03.12a	68.362±05.77a

In STZ-induced DB models, insulin secretion is decreased, and can lead to hepatic damage such as hepatocyte accumulation and abnormality of liver size by dysfunction of glucose metabolism. Therefore, we studied the ALT and AST levels that elevated with liver function abnormalities such as toxin administration, liver cirrhosis, and liver cancer. As shown in Table 1, elevated levels of AST and ALT by STZ also decreased in the group with C.O.A water.

The Report of the C.O.A water

Research institute : Mayo Clinic (USA)

E. Conclusion

1. **C.O.A water has the ability to improve glucose homeostasis in diabetic mouse.**
2. **C.O.A water reversed the decreased body weight in STZ diabetic mice**
3. **C.O.A water was capable of decreasing the increased serum sugar levels in STZ diabetic mice.**
4. **C.O.A water also inhibited the liver damages (AST / ALT level) in STZ diabetic mice.**
5. **C.O.A water protected the decreasing of the insulin-responsive glucose transporter isotype GLUT4 levels by STZ treatment (Data now shown).**

F. Further Study

1. **As we mentioned, although we found the surprising effects of C.O.A water on Diabetes, we still don't know its exact mechanism. It needs more accurate and scientific approach including the finding of the components in C.O.A water for the further study.**
2. **For the study of Diabetes, first, we need to find the C.O.A water's effects towards pancreas, liver and muscles.**
3. **The study will be separated with type I and type II diabetes models.**
4. **C.O.A water might regulate GLUT4 expression. However it needs to confirm whether C.O.A water can control the translocation or expression of GLUT4 to intake glucose.**

Researcher Information

Employer and Address

Mayo Clinic, Division of Oncology Research (Gonda 19-366A),
Mayo Clinic, 200 1st St. SW, Rochester, MN 55902, USA

Name and Position

Ph.D. degree

Korea University Medical college
Dept. Medical Bioscience, Graduate School of Medicine

Published Papers

1.Jung Jin Kim *, Seung Baek Lee *, et al. WSB1 overcomes oncogene-induced senescence by targeting ATM for degradation. ***Cell research.*** 2017 Feb;27(2):274-293. (SCI IF : 15.606) (* : co-first author)
2.SeungBaek Lee*, Jun She*, Bo Deng*, JungJin Kim*, et al. Multiple- level validation identifies PARK2 in the development of lung cancer and Chronic Obstructive Pulmonary Disease. ***Oncotarget.*** Jun 13, 2016; 7(28); 44211-44223. (SCI IF : 6.359)
3.Jung Jin Kim*, Seung Baek Lee*, et al. WSB1 promotes tumor metastasis by inducing pVHL degradation. ***Genes & Development.*** Nov 1, 2015; 29 (21); 2244-2257. (SCI IF : 12.639) (* : co-first author)
4.Seung Baek Lee*, Jung Jin Kim*, et al. Parkin Regulates Mitosis and Genomic Stability Through Cdc20/Cdh1. ***Molecular Cell.*** 2015 Oct 1;60(1):21-34. (SCI IF : 15.282)
* 한국을 빛내는 사람 (한빛사)에 3회 등록

Photo

Sign

MAYO CLINIC

200 First Street SW
Rochester, MN 55905

April 04, 2018

To Whom It May Concern:

The following information relating to the status of SeungBaek Lee, represents the most up to date information available from Mayo Clinic. This information is accurate as of the the date of this letter.

The information displayed in this document is being provided by i2Verify on behalf of Mayo Clinic. i2Verify is the duly authorized agent of Mayo Clinic and has been expressly authorized to provide employment and wage data on behalf of Mayo Clinic.

Hire Date: 11/2/2016

Current Job Title: RTP-RESEARCH ASSOCIATE-LS

Employment Status: Active

Employment Type: Full-time

Separation Date: n/a

FTE: 1.00

If you have any questions, or if you require additional information, please feel free to contact i2Verify at 1-888-458-6319 ext. 704, or via email at info@i2Verify.com.

Thank you,

Anita Heydt, HR Support Services Quality Analyst

The Mayo Clinic is considered a tax-exempt organization under section 501(C) (3) of the Internal Revenue code. The Federal Employer Identification Number (EIN) is: 41-1506440

MAYO CLINIC

200 First Street SW
Rochester, MN 55905

April 04, 2018

To Whom It May Concern:

The following information relating to the status of JungJin Kim, represents the most up to date information available from Mayo Clinic. This information is accurate as of the the date of this letter.

The information displayed in this document is being provided by i2Verify on behalf of Mayo Clinic. i2Verify is the duly authorized agent of Mayo Clinic and has been expressly authorized to provide employment and wage data on behalf of Mayo Clinic.

Hire Date: 11/16/2016

Current Job Title: RTP-RESEARCH ASSOCIATE-LS

Employment Status: Active

Employment Type: Full-time

Separation Date: n/a

FTE: 1.00

If you have any questions, or if you require additional information, please feel free to contact i2Verify at 1-888-458-6319 ext. 704, or via email at info@i2Verify.com.

Thank you,

Anita Heydt, HR Support Services Quality Analyst

The Mayo Clinic is considered a tax-exempt organization under section 501(C) (3) of the Internal Revenue code. The Federal Employer Identification Number (EIN) is: 41-1506440