MICRO LABS LIMITED

# Diabetes Update

Vol. 1 | Issue 2 | 2020

Dear Doctor,

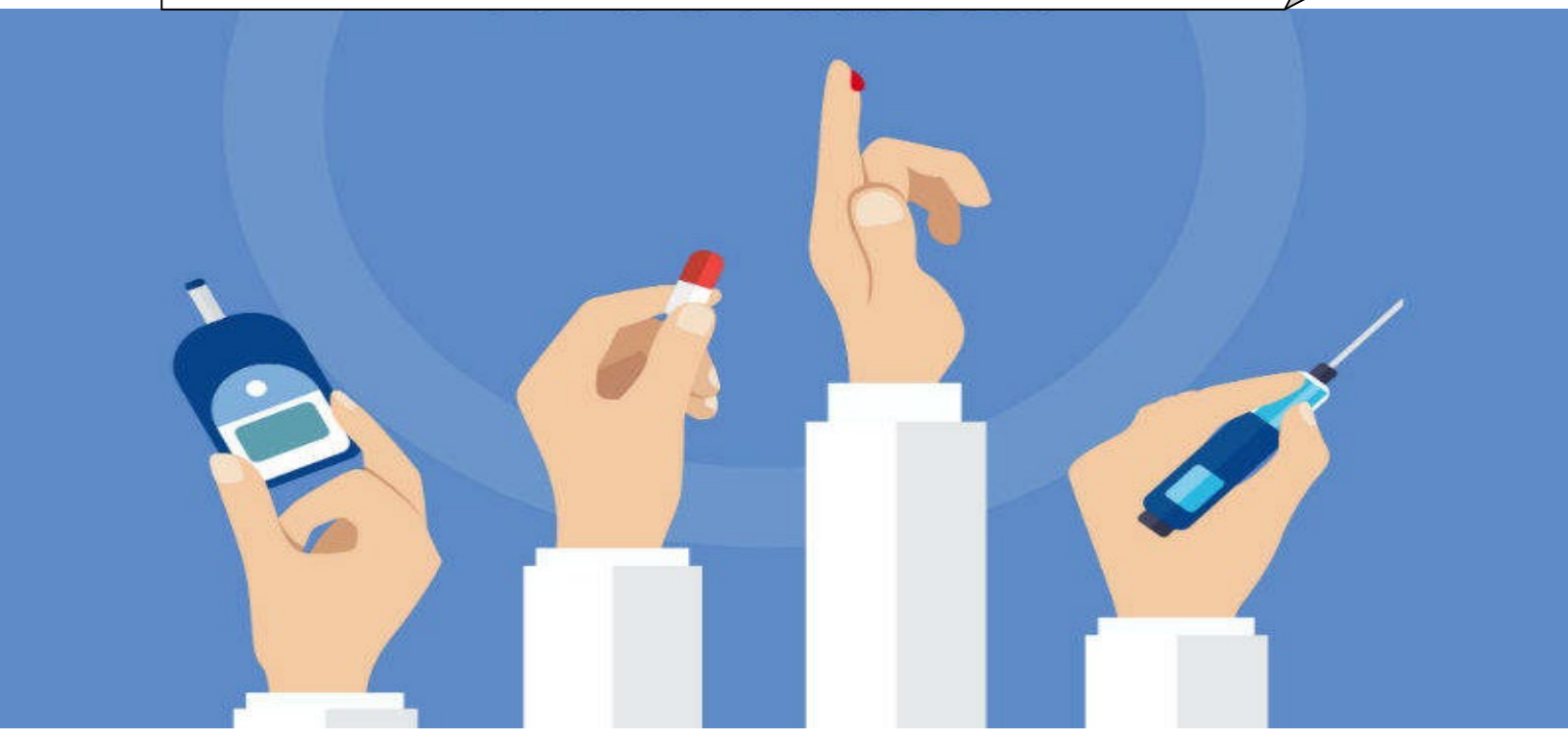
Greetings from Micro Labs Limited. We are happy to bring you "DIABETES UPDATE" which contains latest and interesting news in the field of Diabetes and Endocrinology.

- Role of CoQ10 Supplementation on Oxidative Stress in Type II Diabetes: A Pilot Study
- Association between Serum Ferritin and Blood Lipids: Influence of Diabetes and hs-CRP Levels
- Association between Kidney Disorder and thyroid profile in Type 2 Diabetes: Results from METAL Study

Should you require any specific article or medical information, please feel free to contact us at medicalservices@microlabs.in

Looking forward to your valuable feedback

Best Regards,
Medical Team, Micro Labs Limited



# Diabetes Update

## Role of CoQ10 Supplementation on Oxidative Stress in Type II Diabetes: A Pilot Study

Hyperglycemia in Type 2 Diabetes Mellitus may alter glucose metabolic pathways leading to formation of unfavorable by-products such as reactive oxygen species (ROS). Elevated ROS and its subsequent oxidative stress, due to hyperglycemia in T2D, have been proposed as a major contributing factor leading to diabetic complications including vascular dysfunction. This study was conducted to evaluate Co-enzyme Q10 supplementation and effect on oxidative stress, mitochondrial oxidative phosphorylation capacity, microvascular function, and exercise performance of type II diabetics (T2D).

14 older adults (7 T2D patients with mild peripheral arterial disease (PAD) (69.9 ± 5.1 years) and 7 age-matched controls (67.0 ± 8.9 years) participated in the study. Each participant went through 2 week placebo followed by 2 week CoQ10 supplementation trials. During each trial, participants performed plantar flexion exercise during which gastrocnemius phosphocreatine (PCr), pH, oxygen (O2) saturation and BFindex were measured using 31P magnetic resonance spectroscopy (MRS) and near infrared spectroscopy (NIRS).

Comparing T2D to controls, significant differences were observed in PCrre (22.3 ± 13.4 vs. 49.4 ± 36.6 mM·kg-1·min-1) and BFindex (5.3 ± 2.9 vs. 9.7 ± 2.9%·s-1) ($p = 0.03$). Moreover, O2 saturation recovery was significantly longer for T2D (70.9 ± 52.1 vs. 31.8 ± 8.4 s; $p < 0.01$). When comparing placebo trial to CoQ10 trial, significant reduction in Malondialdehyde (MDA), after CoQ10 trial, was observed in

**Appreciable reduction in MDA seen in healthy, older individuals suggests a positive antioxidant effect of supplementation with CoQ10.**

controls (1.29 ± 0.41 vs. 0.88 ± 0.35 uM, p < 0.05) but not in T2D (1.31 ± 0.19 vs. 1.47 ± 0.36 uM, p > 0.05). With the CoQ10 trial, a trend of improved PCr/Pi in T2D patients at rest was seen (6.87 ± 1.2 to 8.59 ± 2.7). However, no other significant changes were observed with CoQ10 supplementation for either group, including pH, PCr recovery (T2D: 22.3 ± 13.4 vs. 23.2 ± 11.4 mM·kg-1·min-1; CON: 49.4 ± 36.6 vs. 43.7 ± 33.3 mM·kg-1·min-1, p = 0.9), and BFindex (T2D: 5.3 ± 2.9 vs. 3.9 ± 2.2%·s-1; CON: 9.7 ± 2.9 vs. 9.2 ± 2.4%·s-1, p = 0.5). Appreciable reduction in MDA seen in healthy, older individuals suggests a positive antioxidant effect of CoQ10 supplementation. However, when PAD is present, as can be the case of T2D, two weeks of CoQ10 supplementation was not effective.

Source: Sanders et al. Int J Diabetes Clin Res 2020, 7:116

## Association between Serum Ferritin and Blood Lipids: Influence of Diabetes and hs-CRP Levels

Ferritin levels, inflammatory cytokines, hs-CRP, and mortality are related statistics showing that iron-induced oxidative stress may be associated with inflammatory response to PAD. This study is aimed at exploring the relationship between serum ferritin and blood lipids and the influence of diabetes and different hs-CRP levels.

A total of 8163 subjects were analyzed. Participators were classified according to serum ferritin, diabetes, and two hs-CRP levels. Blood lipids were determined using standardized methods and conditions. Except for HDL-C, there was a significant increase in blood lipids in the progressive ferritin group with normal hs-CRP levels (P<0.05). But HDL-C was just the opposite (P<0.05). In nondiabetic patients, TG, TC, and LDL-C were significantly elevated in the progressive ferritin group (P<0.05). And, HDL-C was just the

**There is a positive correlation between serum TG and ferritin.**


| Variables | Total ($n$ = 8163) | Low ferritin < 10.0 ng/mL ($n$ = 431) | Normal ferritin = 10.0 – 299.9 ng/mL ($n$ = 6951) | High ferritin ≥ 300.0 ng/mL ($n$ = 781) | $P$ value |
|---|---|---|---|---|---|
| Insulin ($\mu$IU/mL) | 14.4 ± 22.4 | 11.6 ± 8.9 | 14.3 ± 23.1 | 16.9 ± 21.2 | 0.0003 |
| Insulin (men) ($\mu$IU/mL) | 14.6 ± 23.7 | 10.0 ± 6.96 | 14.4 ± 25.0 | 16.1 ± 16.7 | 0.1149 |
| Insulin (women) ($\mu$IU/mL) | 14.1 ± 20.6 | 11.8 ± 9.1 | 14.1 ± 21.5 | 17.7 ± 17.2 | 0.0113 |
| Antidiabetic drugs | | | | | |
| Oral drugs | 182 (2.2) | 0 (0) | 146 (2.10) | 36 (4.61) | <0.0001 |
| CRP (mg/L) | 2.6 ± 9.0 | 1.3 ± 2.9 | 2.5 ± 8.6 | 4.0 ± 13.8 | <0.0001 |
| Insulin injection | 51 (0.62) | 0 (0.0) | 42 (0.60) | 9 (1.15) | 0.0125 |

Data are given as the mean ± SD or $n$ (%).

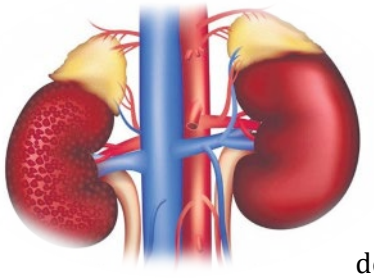
opposite (P<0.05). The generalized linear model and the parsimonious model showed that serum TG was positively correlated with ferritin, and LDL-C was negatively correlated with ferritin (P<0.05). But the correlation between LDL-C and ferritin was broken (P<0.05).

After a sufficient adjustment, there was a positive correlation between serum TG and ferritin and a negative correlation between LDL-C and ferritin. Nonetheless, a negative correlation between LDL-C and ferritin is influenced by diabetes frailly. And, there was no change of relationship between lipids and ferritin in different hs-CRP levels. We found a real relationship between ferritin and lipids after sufficient adjustment for confounders.

Source: Chen Y et al. J Diab Res. 2020. 2020; 4798947; 11 pages. https://doi.org/10.1155/2020/4798947

## Association between Kidney Disorder and thyroid profile in Type 2 Diabetes: Results from METAL Study

Diabetic kidney disease (DKD) is the significant health burden and one of the most common microvascular complications of diabetes mellitus and the leading cause of end-stage renal disease (ESRD) worldwide. This study analyzed the association of thyroid parameters with kidney disorders, especially in euthyroid participants.



The METAL study included 4136 participants with type 2 diabetes were measured. Thyroid parameters, including thyroid-stimulating hormone (TSH), free triiodothyronine (FT3), free thyroxine (FT4), triiodothyronine (T3), thyroxin (T4), thyroid peroxidase antibody (TPOAb), and thyroglobulin antibody (TgAb), of Two structure parameters of thyroid homeostasis, including the sum activity of step-up deiodinases (SPINA-GD) and thyroid secretory capacity (SPINA-GT), and two pituitary thyrotropic function indices, including Jostel's TSH index (TSHI) and the thyrotroph thyroid hormone resistance index (TTSI), were also calculated. Kidney disorders were described according to the presence of reduced estimated glomerular filtration rate (eGFR) and/or higher

urinary albumin to creatinine ratio (UACR).

The prevalence of kidney disorders increased with decreasing FT3 or T3 and increasing FT4 or T4 quartile levels (all P < 0:05). After full adjustment, linear regression showed that UACR levels were negatively associated with FT3 and T3 (P < 0:001). In addition, eGFR was positively associated with FT3 and T3 and was negatively associated with TSH and FT4 levels and TgAb positivity (all P < 0:05). By using binary logistic regression, higher TSH and FT4 and lower FT3 and T3 were associated with kidney disorders (all P < 0:05). Similar results were seen in sensitivity analyses, which were performed in 3035 euthyroid diabetic participants; however, TSH was no longer related to them.

Association of thyroid parameters with UACR and eGFR by linear regression.

| | lnUACR | | lneGFR | |
|---|---|---|---|---|
| | (95% CI) | *P* | (95% CI) | *P* |
| Total participants | | | | |
| TSH | 0.014 (-0.004, 0.033) | 0.136 | -0.007 (-0.010, -0.004) | <0.001 |
| $FT_3$ | -0.171 (-0.242, -0.099) | <0.001 | 0.069 (0.057, 0.080) | <0.001 |
| $FT_4$ | 0.008 (-0.010, 0.025) | 0.399 | -0.003 (-0.006, 0.000) | 0.031 |
| $T_3$ | -0.269 (-0.408, -0.130) | <0.001 | 0.096 (0.074, 0.118) | <0.001 |
| $T_4$ | 0.000 (-0.002, 0.002) | 0.896 | -0.000 (-0.000, 0.000) | 0.752 |
| TPOAb positive | 0.092 (-0.054, 0.238) | 0.215 | -0.023 (-0.046, 0.000) | 0.053 |
| TgAb positive | -0.004 (-0.168, 0.160) | 0.961 | -0.029 (-0.056, -0.003) | 0.028 |
| Euthyroid participants | | | | |
| TSH | -0.029 (-0.080, 0.021) | 0.258 | -0.004 (-0.011, 0.003) | 0.304 |
| $FT_3$ | -0.124 (-0.214, -0.033) | 0.008 | 0.046 (0.034, 0.059) | <0.001 |
| $FT_4$ | 0.011 (-0.012, 0.033) | 0.354 | -0.005 (-0.008, -0.002) | 0.001 |
| $T_3$ | -0.088 (-0.269, 0.092) | 0.337 | 0.045 (0.020, 0.070) | <0.001 |
| $T_4$ | 0.002 (-0.001, 0.004) | 0.264 | -0.001 (-0.001, 0.000) | 0.002 |
| TPOAb positive | -0.005 (-0.186, 0.177) | 0.958 | -0.004 (-0.029, 0.022) | 0.782 |
| TgAb positive | -0.024 (-0.231, 0.184) | 0.822 | -0.031 (-0.060, -0.002) | 0.033 |

**Among patients with type 2 diabetes, elevated thyroid profile is associated with kidney disorders.**

The area under the receiver operating characteristic curve (AUROC) of lower FT3 for existing kidney disorder was greater than that for any other thyroid hormones (all P < 0:001). The cutoff value of FT3 for reduced eGFR was 4.39 pmol/L. Regarding thyroid homeostasis parameters, SPINA-GD was negatively associated with three statuses of kidney disorders, and TSHI and TTSI were positively associated with reduced eGFR (all P < 0:05).

Source: Chen Y et al. J Diab Res. 2020. 2020 Article ID 4798947, 11 pages