# **Association Between Trans Fatty Acids From Natural and Industrial** Sources of Diet and Cardiovascular Risk Factors and Endothelial Function of Patients With Type 2 Diabetes Mellitus

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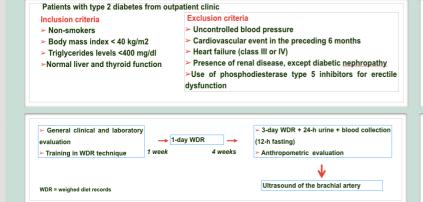
### Introduction

In human nutrition, the three main sources of dietary trans fatty acids (TFA) are: transformation of polyunsaturated fatty acids (PUFA) in the rumen of animals; partial hydrogenation of vegetal oils; and during the process of frying foods. Several studies have investigated the difference between the effect of the intake of TFA from ruminant and industrial sources on the risk of cardiovascular disease (CVD). However, these studies often present conflicting results. Considering the importance to minimize the risk of CVD by carefully managing modifiable risk factors in patients with type 2 diabetes mellitus (DM), a better understanding of the different sources of TFA intake and their effects on endothelial function and cardiovascular risk factors is essential.

## **Obiective**

To evaluate the relationship between the food products of natural and industrial origin and cardiovascular risk factors, endothelial function and ischemic heart disease (IHC) in patients with type 2 DM.

## Methodology



#### Nutritional evaluation . 3-day WDR: one weekend day and to weekdays Nutribase Clinical Nutritional Manager softw Blood pressure control Renal function: serum creatinine, urinary albumin (PI) of the WDR to the PI estimated by urinary urea in 24h A spreadsheet was constructed to calculate the TFA with - Coronary heart disease (WHO CV questionnaire, ECG ) data from the Brazilian Table of Food Composition (TACO Peripheral vascular disease (intermittent claudication, - Tabela Brasileira de Composição dos Alimentos) and the absence of posterior tibial pulse) American table (USDA).

#### Endothelial function assessment

Ultrasound of the Brachial Artery

Endothelial-Dependent Flow-Mediated Vasodilation (FMD): Reactive hyperemia postischemia (arterial occlusion with sphygmomanometric cuff inflation) -> Record of the longitudinal image of the artery (from 30 s before to 2 min after cuff deflation)

Endothelium-Independent Vasodilation: Reflecting vascular smooth muscle function. Peak vasodilation occurs 3 to 4 min after single dose (0.4 mg) of nitroglycerin spray

## Results

186 patients were analyzed (44% men; mean age: 63 y. and mean BMI: 29.4 kg/m²).

Table 1. Clinical and laboratory characteristics of patients with type 2 diabetes categorized according to the median of Ruminant TFA - VET% (0.33).

|                         | Ingestion<br>< 0.33 | Ingestion<br>> 0.33 | Р     |
|-------------------------|---------------------|---------------------|-------|
| Age                     | 64 ± 9              | 62 ± 10             | 0.12  |
| Men                     | 42%                 | 49%                 | 0.45  |
| Duration of DM (years)  | 17 ± 8              | 16 ± 9              | 0.37  |
| Waist circumference     | 99 ± 10             | 103 ± 9             | 0.012 |
| BMI (kg/m2)             | 28.7 ± 4.3          | 30.3 ± 4            | 0.15  |
| Hypertension (%)        | 81%                 | 83%                 | 0.70  |
| Plasma Glucose (mg/dL)  | 40%                 | 36%                 | 0.64  |
| A1c (%)                 | 145 ± 54            | 170 ± 66            | <0.01 |
| Total Cholesterol (mg/  | 8.2 ± 1.8           | 8.2 ± 1.5           | 0.89  |
| HDL cholesterol (mg/dL) | 180 ± 47            | 182 ± 40            | 0.79  |
| LDL cholesterol (mg/dL) | 48 ± 13             | 46 ± 11             | 0.24  |
| Non-HDL cholesterol     | 103 ± 41            | 102 ± 34            | 0.78  |
| Triglycerides (mg/dL)   | 131 ± 54            | 139 ± 39            | 0.48  |

It was observed that the intake of TFA of ruminants was associated with the WC of higher CV risk (dependent variable) [Risk Ratio: 2.45 (95% CI: 1.11 - 5.38); P=0.026], adjusted for sex and age.

Table 2. Analysis of endothelial function of patients with type 2 diabetes divided according to trans-r.

|  | Lower<br>trans-r intake | Higher<br>trans-r intake | Р     |  |
|--|-------------------------|--------------------------|-------|--|
| FMD (%)  | 5,74<br>(-1,6 - 16,9)   | 4.9<br>(-2.6 - 20,1)     | 0,606 |  |
| Proportion with<br>lower FMD (%) *   | 48,9                    | 52,2                     | 0,38  |  |
| Diameter of the brachial artery (mm)   | 0,34<br>(0,22 - 0,53)   | 0,36<br>(0,18 - 0,53)    | 0,108 |  |
| Proportion with larger diameter (%)  | 45,6                    | 57,8                     | 0,068 |  |
| Data are expressed as median (minimum-maximum) or patients with the characteristic (%) flow- |                         |                          |       |  |

Also, the intake of TFA of ruminants was associated with the greater diameter of the brachial artery [Risk Ratio: 1.93 (95% CI: 1.01 - 3.69); P=0.047], adjusted for age, presence of hypertension and WC.

No association was found between the TFA from industrial sources and the CV risk factors and parameters of endothelial function.

When dietary characteristics of patients with and without IC were compared, no significant differences were observed between energy intakes, macronutrients, as well as the intake of trans-FA and its fractions.

### **Conclusion**

The present study suggests that the greater consumption of TFA from ruminant sources in patients with type 2 DM is related to the greater abdominal circumference and worse endothelial function.

