Assessment of left ventricular systolic and diastolic function in diabetic rat model using Electrocardiography-gated 18F-FDG PET imaging

Eissler Christoph 1,2,3,*, Nobuyuki Hayakawa 3, Paula-Anaí Arias-Loza 2, Hiroshi Wakabayashi 3, Rudolf Werner 1,3, Tetsuya Shinaji 1,3, Constantin Lapa 3, Theo Pelzer 2, Takahiro Higuchi 1,3

1 Comprehensive Heart Failure Center, University Hospital Wuerzburg, Wuerzburg, Germany
2 Internal Medicine I University Hospital Wuerzburg, Wuerzburg, Germany
3 Nuclear Medicine University Hospital Wuerzburg, Wuerzburg, Germany

E-mail address: christoph.eissler@web.de (E. Christoph).

Aim: In this study, we explore the potential of ECG-gated 18F-FDG PET to assess LV systolic and diastolic function in a well-stabilized rat model of type 2 diabetes.

Introduction: Left ventricular (LV) diastolic dysfunction, defined as a disruption of the normal filling pattern of the ventricle but normal systolic function, is one of the early signs of cardiac involvement in diabetic patients.

Methods: List-mode gated 18F-FDG PET imaging was performed on a rat model of type 2 diabetes (ZDF fa/fa) (n = 6) and ZL control rats (n = 6) at age of 13 weeks 15–30 min after tracer-administration (37 MBq) via tail vein under hyperinsulinemic-euglycemic clamp (E. Christoph).

Results: In the examined population regular use of DS/OTC was declared by 67% subjects. The most commonly, regularly used substances were minerals and microelements (60.4%), vitamins (48.5%), analgesics (18.8%), drugs increasing the immunity (18.8%), relieving gastrointestinal symptoms (18.8%) and omega acids (18.8%). There were no differences in the frequency of DS/OTC use in relation to number of antihypertensive drugs, educational level, age and income. Women are more frequent regular users of DS/OTC than men (n = 65 vs. n = 36, p = 0.03). Only 38% of responders always consulted the use of DS/OTC with a doctor. The majority of responders (52%) is not aware of possible influence of DS/OTC on antihypertensive medication or blood pressure control. Cost of DS/OTC in 23% of responders is equal or higher than cost of prescribed drugs.

Conclusion: In a rat model of type 2 diabetes, we demonstrated the ability of ECG-gated-18F-FDG PET together with a clinical ventricular edge detection software to assess reliable LV systolic and diastolic parameters and to detect the presence of a diastolic dysfunction in the diabetic rats.