



## How to screen NAFLD patients for diabetes?

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### Dear editor:

We read with great interest the article by Fukuda, *et al.*<sup>1</sup> who found in a population-based retrospective cohort study among 4,629 participants that non-overweight individuals with non-alcoholic fatty liver disease (NAFLD) had a high risk of incident type 2 diabetes mellitus (T2DM). In developed countries NAFLD is the leading cause of chronic liver disease (CLD), as data showed that between 1988 to 1994 NAFLD accounted for 46.8% of all CLD, and between 2005 to 2008 it accounted for 75.1%.<sup>2</sup> Fukuda, *et al.*<sup>1</sup> showed that the adjusted hazard ratio for incident T2DM in the non-overweight with NAFLD group was significantly higher than that in the overweight without NAFLD group ( $P < 0.05$ ) as well as that in the non-overweight without NAFLD group ( $P < 0.01$ ). Recently, Koehler, *et al.*<sup>3</sup> not only demonstrated the important relationship between NAFLD/DM, but also illustrated that DM is closely related with the development of fibrosis. We think an important fact has not been extensively addressed; recently, it has been suggested that NAFLD patients should be screened for DM, however, there is no emphasis about which method should be used, fasting plasma glucose (FPG), glycosylated hemoglobin (HbA1c), or oral glucose tolerance test (OGTT). Fukuda, *et al.*<sup>1</sup> defined T2DM according to an HbA1c  $\geq 6.5\%$  or FPG  $\geq 126$  mg/dL or as the initiation of T2DM treatment. Recent evidence suggests that the best tool for screening NAFLD patients for T2DM is not FPG. In a study by Manchanayake, *et al.*<sup>4</sup> 70 non-diabetic NAFLD patients underwent OGTT. One-third (34%) of patients had abnormal OGTT (24% impaired glucose tolerance and 10% DM). Importantly, only 25% of patients with abnormal OGTT had impaired FPG. Although, in this cohort, few patients had liver biopsy, those with abnormal OGTT were more likely to have cirrhosis (13%) than those with normal OGTT (4.5%). An important step in the management

of NAFLD patients is to identify patients at risk to develop non-alcoholic steatohepatitis, and in this context, it seems that NAFLD patients with glucose metabolism alterations are at increased risk. Further large prospective studies should confirm if OGTT is the best way to screen NAFLD patients for DM.

### ABBREVIATIONS

- **CLD:** chronic liver disease.
- **FPG:** fasting blood plasma glucose.
- **NAFLD:** non-alcoholic fatty liver disease.
- **OGTT:** oral glucose tolerance test.
- **T2DM:** type 2 diabetes mellitus.

### CONFLICT OF INTEREST

The authors have no conflict of interest and no financial support to disclose.

### REFERENCES

1. Fukuda T, Hamaguchi M, Kojima T, Hashimoto Y, Ohbora A, Kato T, Nakamura N, et al. The impact of non-alcoholic fatty liver disease on incident type 2 diabetes mellitus in non-overweight individuals. *Liver Int* 2016; 36: 275-83.
2. Younossi ZM, Stepanova M, Afendy M, Fang Y, Younossi Y, Mir H, Srishord M. Changes in the prevalence of the most common causes of chronic liver diseases in the United States from 1988 to 2008. *Clin Gastroenterol Hepatol* 2011; 9: 524-30.e1; quiz e60.
3. Koehler EM, Plompen EP, Schouten JN, Hansen BE, Darwish Murad S, Taimr P, Leebeek FW, et al. Presence of diabetes mellitus and steatosis is associated with liver stiffness in a general population: The Rotterdam study. *Hepatology* 2016; 63: 138-47.
4. Manchanayake J, Chitturi S, Nolan C, Farrell GC. Postprandial hyperinsulinemia is universal in non-diabetic patients with nonalcoholic fatty liver disease. *J Gastroenterol Hepatol* 2011; 26: 510-6.

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