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Therefore, this United States

# Patent

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(12) **United States Patent**  
**Asano et al.**

(10) **Patent No.:** **US 11,071,738 B2**  
(45) **Date of Patent:** **\*Jul. 27, 2021**

(54) **THERAPEUTIC AGENT FOR FATTY LIVER DISEASES AND THERAPEUTIC AGENT FOR ADIPOSITY**

(51) **Int. Cl.**  
*A61K 31/19* (2006.01)  
*A61K 31/415* (2006.01)

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(71) Applicants: **Hiroshima University, Higashihiroshima (JP); Tokyo University of Pharmacy & Life Sciences, Hachioji (JP); The University of Tokyo, Tokyo (JP)**

(52) **U.S. Cl.**  
CPC ..... *A61K 31/5377* (2013.01); *A61K 31/341* (2013.01); *A61K 31/403* (2013.01);  
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(72) Inventors: **Tomoichiro Asano, Hiroshima (JP); Yusuke Nakatsu, Hiroshima (JP); Hisanaka Ito, Hachioji (JP); Takayoshi Okabe, Tokyo (JP)**

(58) **Field of Classification Search**  
CPC . *A61K 31/192*; *A61K 31/198*; *A61K 31/4184*  
(Continued)

(73) Assignees: **Hiroshima University, Higashihiroshima (JP); Tokyo University of Pharmacy & Life Sciences, Hachioji (JP); The University of Tokyo, Tokyo (JP)**

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514/288

(\* ) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

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This patent is subject to a terminal disclaimer.

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(21) Appl. No.: **16/636,752**

Stal "Liver fibrosis in non-alcoholic fatty liver disease-diagnostic challenge with prognostic significance," World J. Gastroenterology, 2015, vol. 21, p. 11077-11087 (Year: 2015).\*

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(57) **ABSTRACT**

(65) **Prior Publication Data**

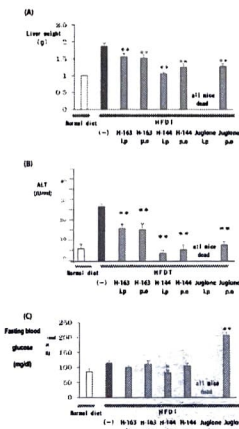
US 2020/0383989 A1 Dec. 10, 2020

The purpose of the invention is to develop a novel therapeutic agent for fatty liver diseases such as NASH or NAFLD. The invention provides a therapeutic or prophylactic agent for fatty liver diseases that comprises, as an active ingredient, a compound represented by formula (I) or a pharmaceutically acceptable salt thereof. The invention

(30) **Foreign Application Priority Data**

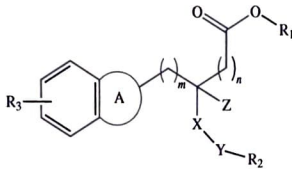
Aug. 7, 2017 (JP) ..... JP2017-152807

(Continued)





also provides a therapeutic or prophylactic agent for adiposity that comprises, as an active ingredient, a compound represented by formula (I) or a pharmaceutically acceptable salt thereof.



15 Claims, 4 Drawing Sheets

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- (58) **Field of Classification Search**  
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 See application file for complete search history.
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