

**Section of
Public Affairs**Mi-Yeon Kim
Section Chief
(+82) 62-715-2020Nayeong Lee
Senior Administrator
(+82) 62-715-2024**Contact Person
for this Article**Professor Tae Young Kim
School of Earth Science and
Environmental Engineering
(+82) 62-715-3647**Release Date**

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Professor Tae Young Kim's research team develops a high efficiency method to analyze turnover of lipids

- GIST (President Seung Hyeon Moon) – Professor Tae Young Kim of the School of Earth Science and Environmental Engineering led a research team that has developed a high efficiency method to analyze the turnover * of lipids by using partial heavy water labeling **.

* Bio-molecular replacement rate in cells

** Stable isotope labeling technique uses deuterium-substituted water to introduce deuterium into biomolecules involved in metabolic processes

- Functional impairment in lipid homeostasis leads to metabolic diseases such as diabetes, obesity, and atherosclerosis. Lipid turnover studies provide information on the flux of lipids and can be used as an index to diagnose these diseases.
- The research team proposed a new analysis technique by combining the heavy water labeling method with a high-resolution mass spectrometer. In addition, GIST College students participated as researchers and succeeded in developing their own software for high-efficiency processing of data analysis for lipid identification, peak quantification, and non-linear regression.

- In addition, the developed analytical platform was applied to HeLa cells, which are a representative model for cancer cell. Cells were labeled with heavy water for up to 48 hours and lipids were extracted from the labeled cells for a total of 8 hours and analyzed by liquid chromatography-mass spectrometry.
 - As a result, a total of 100 individual lipid turnover rates including glycerolipid, glycerophospholipid, and sphingolipid were measured, which is the largest lipid turnover measurements reported so far.
 - In addition, a new method for distinguishing and measuring the dynamics of fatty acyl chains and glycerol backbones in lipid molecules based on tandem mass spectrometry has been proposed.
- Professor Tae Young Kim said, "In contrast to the conventional lipid turnover method, only the average value of each lipid species was obtained. The method developed in this study can measure the turnover value of individual lipid molecules to provide more accurate information about the dynamics of lipids."
- This research was led by Professor Tae Young Kim and was supported by the National Research Foundation of Korea. Their paper entitled "High-Throughput Measurement of Lipid Turnover Rates Using Partial Metabolic Heavy Water Labelling" was published in *Analytical Chemistry* on June 5, 2018.

