

(様式1)

公益社団法人日本栄養・食糧学会 研究業績

<学 会 賞>

1. 候補者

研究題目:(和)	ニュートリゲノミクスの基盤構築と食品機能研究への応用		
(英)	Building a platform of nutrigenomics and its application for the study of food functionality		
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所属機関:(和)	東京大学総括プロジェクト機構 特任教授		
(英)	Project Professor, Organization for Interdisciplinary Research Projects, The University of Tokyo		
学 位:	農学博士	最終学歴:	昭和63年11月 東京大学大学院農学系研究科農芸化学専攻博士課程中退
専門分野	①栄養生理学、②栄養生化学、③分子栄養学、④公衆栄養学、⑤臨床・病態栄養学、⑥食生態学、⑦調理科学、⑧食品化学・食品分析学、⑨食品機能学、⑩食品工学、⑪食品加工・流通・貯蔵学、⑫食品衛生・安全学、⑬生理学、⑭生化学、⑮分子生物学、⑯臨床医学(内科系)、⑰臨床医学(外科系) ⑱その他		
履 歴	昭和63年11月 平成2年10月 平成3年4月 平成5年4月 平成11年4月 平成18年10月 平成21年6月	東京大学農学部 助手 農学博士(東京大学) アメリカ合衆国 NIH, 糖尿病部門 客員研究員(2年間) 宇都宮大学農学部 助教授(生物生産科学科) 東京大学大学院農学生命科学研究科 助教授 東京大学農学部食の研究センター 副センター長(兼任) 東京大学総括プロジェクト機構 総括寄付講座「食と生命」 特任教授	
会員番号:		入会年度:	昭和63年

2. 研究業績要旨(1,000字以内)

ニュートリゲノミクスは、栄養学・食品科学における各種分子や現象の網羅的解析によるアプローチである。ニュートリゲノミクスの萌芽時よりこの分野に取り組んできた候補者は、その適切な利用手法や有効性に関する情報を広く明らかにしてきた。最初に手がけた例は、タンパク質栄養による肝臓等の遺伝子発現プロファイルへの影響の解析であり、タンパク質栄養が脂質代謝関連の様々な酵素遺伝子にダイナミックに影響を及ぼすことなどを明らかにした。これはタンパク質栄養に関する世界で初めてのニュートリゲノミクスの論文となった(直接関連のある論文リスト 10)。その後様々な栄養条件や食品成分の摂取などに関してオミクスの活用を進めてきたが、特に国内外のニュートリゲノミクス研究の推進に寄与すべく、ニュートリゲノミクスデータベースを作成して公開し(8)、さらにオミクスデータの簡便な解析に利用できるデータ解析ツールも新たに開発し公開した。これらと併せ、絶食や軽度なカロリー制限等の栄養条件の変化に対する各種オミクスデータを蓄積し、ニュートリゲノミクス研究における参照データ、あるいはバイオマーカー探索の基礎データとして活用できることを示した(7, 8, その他の原著論文④)。食品や食品成分の新規作用や作用メカニズムをオミクス解析によって明らかにした成果として、コーヒー摂取の抗肥満・抗糖尿病効果、パセリによる腸炎抑制効果、分岐鎖アミノ酸による肝硬変症状改善作用、卵殻膜粉末の肝機能改善効果、キクイモ粉末の抗糖尿病効果などがある(1, 2, 3, 4, 6, ①, ④他)。また、ロイシン過剰摂取の影響に IGFBP-1 や FGF21 等の遺伝子発現が関連し、これらがバイオマーカーとなり得ることなどを見出した。すなわち、食の安全に関する研究においてもニュートリゲノミクスが強力なツールとなることを示してきた(5, ②他)。近年、生命科学においてトランスクリプトーム、プロテオーム、メタボロームなど複数のオミクス解析を組み合わせたマルチオミクス(トランスオミクス)の重要性が提唱されているが、これまで実際例はほとんどなかった。マルチオミクス解析を行うことで、例えばコーヒー摂取は、PPAR γ 関連因子や TCA サイクル、尿素サイクルなどの協調した変化を誘導することなどを明らかにした。これらの研究で示されたマルチオミクス解析の活用例(1, 3, 4, 5)により、食品機能の網羅的解明がさらに加速することが期待される。

3. 報文等リスト

(1) この研究に直接関連するもの(10 編以内)

1. Jia, H., Aw, W., Hanate, M., Takahashi, S., Saito, K., Tanaka, H., Tomita, M. and Kato, H. Multi-faceted integrated omics analysis revealed Parsley (*Petroselinum crispum*) as a novel dietary intervention in dextran sodium sulphate induced colitic mice. *J. Funct. Foods*, in press
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- *5. Imamura, W., Yoshimura, R., Takai, M., Yamamura, J., Kanamoto, R. and Kato, H. Adverse effects of excessive leucine intake depend on dietary protein intake: A transcriptomic analysis to identify useful biomarkers. *J. Nutr. Sci. Vitaminol.* **59**, 45-55 (2013)
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(2) その他の論文(編数制限なし)

((1)に挙げた以外で本研究に直接関連のあるものを囲み番号とした)

原著論文

- ①. Chang, W.-C., Jia, H., Aw, W. Saito, K., Hasegawa, S. and Kato, H. Beneficial effects of soluble dietary Jerusalem artichoke (*Helianthus tuberosus*) in the prevention of the onset of Type 2 diabetes and NAFLD in high fructose-fed rats. *Brit. J. Nutr.* **112**, 709-717 (2014)
2. Toyoshima, Y., Tokita, R., Taguchi, Y., Akiyama-Akanishi, N., Takenaka, A., Kato, H., Chida, K., Hakuno, F., Minami, S. and Takahashi, S.-I. Tissue-specific effects of protein malnutrition on insulin signaling pathway and lipid accumulation in growing rats. *Endocr. J.* **61**, 199-512 (2014)
- ③. Fukushima, E., Monoi, N., Mikoshiba, S., Hirayama, Y., Serizawa, T., Adachi, K., Koide, M., Ohdera, M., Murakoshi, M. and Kato, H. Protective effects of acetaminophen on ibuprofen-induced gastric mucosal damage in rats with associated suppression of matrix metalloproteinase. *J. Pharmacol. Exp. Ther.* **349**, 165-173 (2014)
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主な総説

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その他総説・著書等 51 件

(3) 過去 5 年間の本学会での活動状況

・理事、委員等

庶務担当理事(平成 20 年度～25 年度のうち過去 5 年該当は平成 21 年度から。以下同様)
代議員(平成 25 年度～)
広報委員(平成 20 年度～25 年度) 同委員長(平成 20 年度～23 年度)
国際交流委員(平成 20 年度～25 年度) 同委員長(平成 24 年度～25 年度)
第 12 回アジア栄養学会議 事務局長、組織委員、募金委員
学会誌編集委員(平成 18 年度～21 年度)
用語辞典委員(平成 20 年度～24 年度)
あり方検討 WG・あり方検討委員会 委員(平成 23 年度～25 年度)
公益法人化 WG 主査(平成 20 年度～23 年度)
規約類の整備 WG メンバー(平成 20 年度～23 年度)
和文誌電子化 WG メンバー(平成 20 年度～21 年度)
第 22 回国際栄養学会議 誘致 WG 座長(平成 24 年度～25 年度)
第 22 回国際栄養学会議 準備委員会委員長(平成 25 年度～)
第 65 回大会(平成 23 年) 実行委員
関東支部役員 (平成 24 年度～25 年度)
第 1 回 IUNS 栄養学のリーダーシップ育成国際ワークショップ 実行委員(平成 22 年度)
第 2 回 IUNS 栄養学のリーダーシップ育成国際ワークショップ 組織委員長(平成 26 年度)

・シンポジスト

第 65 回大会(平成 23 年) ジョイントシンポジウム「網羅的解析技術による食品の機能性研究の現状」
第 67 回大会(平成 25 年) スポンサーシップシンポジウム「メタボローム解析技術の進歩と食品研究～食品
の機能性と色の安全への新たなアプローチ～」
Experimental Biology 2014, (April, 2014), The American Society for Nutrition – JSNFS
Joint Symposium “Activity of JSNFS and status of nutritional science in Japan”

・座長等

第 67 回大会(平成 25 年) 国際シンポジウム “Nutrition as novel strategies for disease
prevention” オーガナイザー・座長
第 68 回大会(平成 26 年) 国際シンポジウム “Global challenges and opportunities for
nutritional well-being” オーガナイザー・座長
第 68 回大会(平成 26 年) シンポジウム SY9 「食育を支える科学とはー基礎から応用まで」 座長
第 91 回関東支部大会シンポジウム(平成 25 年 2 月) 座長
一般講演座長: 第 64 回、第 66 回、第 67 回

(4) 特記事項

日本農芸化学会 1997 年 農芸化学奨励賞 「IGF-I の活性発現機構に関する分子生物学的研究」

