

## Rapid Transition of Molecular Nutrition Research Based on Innovative Concepts and Technologies

**Hisanori Kato**

The University of Tokyo, Japan

In recent years, the molecular nutrition research community has witnessed remarkable transformations in multiple aspects of our field of study. The next decade will be one of the most dramatic periods of progress in basic nutritional science. Some of the disciplines and technologies involved can be briefly described as follows.

**1. Nutrigenomics and Nutrigenetics:** More than a decade has passed since the term ‘nutrigenomics’ was introduced. This area is continuing to expand with the aid of new technologies and findings. Combinations of multiple omics analyses are now an effective strategy for unveiling the mechanisms underlying the functions of foods. As for nutrigenetics, the expansion of large-scale genetic tests in Japan may reflect the growing concern among the Japanese regarding their genetic makeup.

**2. Epigenetics:** Epigenetic modifications (DNA methylation, histone modifications, non-coding RNAs, etc.) are also emerging targets of molecular nutrition and nutrigenomics research. The growing evidence of very long-term effects of diet and even the generation-to-generation transfer of epigenetic modifications is the subject of increasing attention among researchers.

**3. Next-Generation Sequencing (NGS):** Whole genome sequencing of each individual is now practical by NGS. NGS is also playing pivotal roles in transcriptome, epigenome, and metagenome analyses.

**4. Genome Editing:** Genome editing technology such as that using the CRISPR/Cas9 system has enabled us to modify gene sequences in many organisms. For example, gene-knockout rats can be created in a short period. Some studies have shown that the consequence of the knockout of a specific gene in rats is different from that in mice, which obliges us to reconsider the function of some genes.

**5. Others:** Space limitations do not allow me to describe them all here, but Stem Cells Microbiome, and artificial intelligence are certainly main players in the coming molecular nutrition revolution.

The field of molecular nutrition is thus shifting to “big” science, and thus more and more collaborations among researchers across the world will be required.

### Biography:

Dr. Hisanori Kato is a Project Professor of the University of Toyo. Dr. Kato received his PhD from the University of Tokyo in 1990. He has been at the current position since 2017. Dr. Kato is the Secretary General of Federation of Asian Nutrition Societies (FANS) and is the Chair of the Organizing Committee of the 22nd International Congress of Nutrition (ICN2021). He is also the President-Elect of Asia-Pacific Nutrigenomics and Nutrigenetics Organization. He is the president of the Japanese Society for Amino Acid Sciences, the vice-president of Japan Society of Nutrition and Food Science, and a member of Science Council of Japan.