

10. Tumors gene panel testing

Tumors gene panel testing can analyze multiple genes known to be associated with cancer development, regulation, and progression. It has the ability to assess thousands of targets at once, greatly amplifying the discovery potential per sample. Furthermore, it can be utilized to improve translational medicine and therapies in the future.

Medical applications of service

- Providing a detailed genetic tumor profile
- Identifying potential drug resistance
- Informing treatment decisions for better outcomes

Drug and biopharma applications of service

- Discovering biomarkers
- Identifying new therapeutic targets
- Detecting a treatment effect and accelerating the drug development process
- Optimizing drug dosing and reducing the risk of adverse reactions



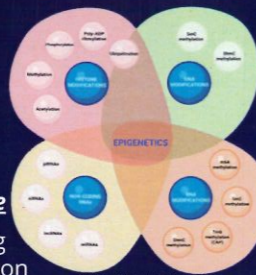
Illumina MiSeq FGx

11. Epigenetic testing

Epigenetic testing is emerging as a valuable tool in the field of personalized medicine. Illumina provides sequencing data, which can be analyzed to reveal epigenetic information from gene expression patterns. These patterns, influenced by both lifestyle and environmental factors hold the potential to inform the development of personalized health plans focused on disease prevention and promoting overall health

Medical applications of service

- Biological age
- Treatment optimization
- Mental health assessment
- Disease risk assessment and monitoring disease progression



Drug and biopharma applications of service

- Epigenetic biomarkers for drug targeting
- Understanding mechanisms of drug action
- Patient stratification and personalized medicine
- Toxicity testing

Agricultural and food applications of service

- Crop improvement
- Food safety and quality
- Food authenticity and traceability
- Livestock production and animal health



12. SNPs genetic testing

Single nucleotide polymorphism (SNP) genotyping leverages Illumina technology to comprehensively analyze variations within the genome. These variations, each involving a single nucleotide difference, influence individual responses to medications and can predict individual variability in drug response, and even elucidate ancestral lineages.

Medical applications of service

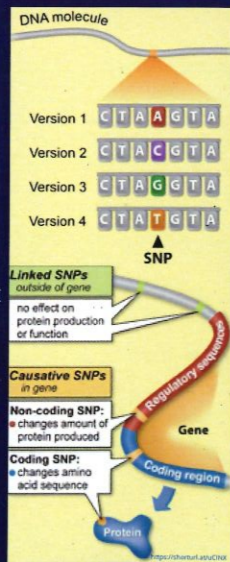
- Clinical trial design
- Disease risks assessment
- Monitoring and prognosis
- Tracing genetic ancestry and migration patterns

Drug and biopharma applications of service

- Drug response prediction
- Personalized drug design
- Pharmacogenomics and drug development

Agricultural and food applications of service

- Crop and livestock breeding improvement
- Food safety and quality control
- Identifying certain nutritional deficiencies for improved personalized nutrition



13. Whole genome sequencing (Bacteria, Virus etc.)

This service provides the full potential of genomic sequencing of bacterial and viral for genetic discovery and innovative research at fundamental and innovative levels. This service provides insight into the genomic architecture and diversity of organisms as well as their functional capabilities by uncovering their genetic blueprint.

Medical applications of service

- Identification and characterization of genetic variation associated with human diseases, such as cancer, genetic disorders,
- Infectious diseases development of personalized treatment strategies and precision medicine approaches.

Drug and biopharma applications of service

- Drug discovery and biopharmaceutical development
- Biomarker discovery
- Drug development pipeline optimization



Agricultural and food applications of service

- Identifies and studies the genetic diversity,
- Functional potential of microbial communities in diverse environments, such as soils and waters



Oxford Nanopore Sequencer MinION (Mk1C)

14. Transcriptome checking

This service analysis of gene expression patterns to provide critical insights into the molecular landscape of biological samples. With accurate and actionable data, it can be used to understand disease mechanisms, optimize agricultural productivity, discover gene regulation and advance in a number of fields.

Medical applications of service

- Identifying biomarkers
- Finding novel therapeutic targets



Drug and biopharma applications of service

- Drug discovery and biopharmaceutical development
- Drug targets



Agricultural and food applications of service

- Discover genetic factors that influence yield
- stress tolerance, and nutritional quality to optimize crop breeding programs
- Monitoring expression patterns of genes related to food spoilage, pathogen contamination, and nutrient composition

15. Functional microbiome testing

This service provides comprehensive analysis of microbial communities, which provides valuable insight into the diversity and dynamics of their functional roles. This information is crucial for advancing our understanding of microbiomes and their impact on diverse ecosystems and biological systems.

Medical applications of service

- Clinical bacterial pathogen diagnostics

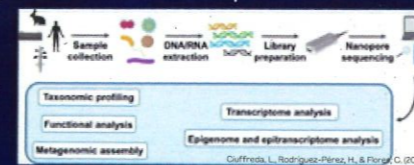
Drug and biopharma applications of service

- Identifying microbial targets relevant to drug discovery and development, offering potential avenues for therapeutic intervention
- microbiome-based biomarkers for drug response, disease diagnosis,



Agricultural and food applications of service

- Characterization of microbial communities in food products
- Identification and characterization of beneficial microorganisms for biological pest control
- Agricultural microbiomes
- Providing valuable insights into microbial adaptation, evolution, and biodiversity



Phenome Education and Capacity-building Unit (PECU)

To provide world-class omics and omics-related (e.g., coding) training programs for researchers from both governmental and public sectors.

"We offer you an unrivaled training experience in modern scientific techniques from basic principles to advanced hands-on experiments."

IRURP Symposium



CliNaP-M



Hi-Tech-DS Short Course



Bioinformatics Courses



Multi-Omics Short Course 1 & 2



Phenome Biobased and Clinical Translation Unit (PBCTU)

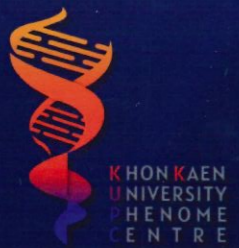
To facilitate high quality product research and development for manufacturers and researchers worldwide.



Press conference on the health rice research project under the project "BaiboonRice" Cento Golden Group Co., Ltd., in collaboration with Khon Kaen University, through the Khon Kaen University Phenome Centre.



Signing ceremony of the memorandum of understanding for academic collaboration. "The microbiome research collaboration project on the gastrointestinal tract of the Thai population" between Khon Kaen University, through the Khon Kaen University Phenome Centre, and Mod Gut Co., Ltd.



Khon Kaen University Phenome Centre

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KKUPC provides molecular phenotyping services and quality assurance for clinical and other specimens, food, drugs and agricultural products. Moreover, we provide academic training courses and research and development scheme to co-develop products and innovations with all sectors.

Supportive Services

- Cell-based Bioassays
- Statistical Analysis and Interpretation
- In silico Docking for Small Molecule-Protein
- Experiment Consultation
- Conceptual Framework Design
- Certification Consultation

Phenome Analytical Service Unit (PASU)

To provide high quality laboratory services including measurement of gene expression, proteins and metabolites and product quality assurance for medical, agricultural and food & drug industries.

1. Global metabolic discovery panel

In untargeted metabolic profiling, high-resolution analytical methods are utilized to acquire holistic profiles. Structural elucidation of small molecules can be conducted. This method provides the characterization of chemical composition of biological systems.

Medical application of service

- Biomarker discovery in human specimens, for example, serum, plasma, urine, feces etc.
- Biomarker validation objectives with precise and fully validated methods
- Metabolism in living tissues and organisms
- Change of metabolite in living tissue and organism

Drug and pharma applications of service

- Determination of drugs and drug metabolites.
- Elucidation and confirmation of natural product structures
- Determination to characteristic the composition of drug product
- Determination the impurity profile of drug

Agricultural and food applications of service

- Determination of toxins from pesticide such as insecticides, herbicides etc.
- Profiling of nutrients including protein, carbohydrate, vitamin, mineral and lipid
- The composition of biomolecules of plant such as metabolites specific to the age and growth of plant
- Metabolite data for plant natural product discovery

- Antidementia effects of *Althernanthera philoxeroides* in ovariectomized mice supported by NMR-Base metabolomic analysis** (Khampakdee et al., 2021)
- Spirogyra neglecta* (Hassall) Kützing attenuates metastasis of castration-resistant human prostate cancer via the blockage of AKT signaling pathway** (Punnida et al., 2021)
- ¹H NMR metabolic phenotyping of *Difterocarpus alatus* as a novel tool for age and growth determination** (Phetcharaburanin et al., 2020)

2. Liver health monitoring panel

Use sample of blood or tissue to study of metabolites that related to liver functions for the detection of early biomarkers and metabolic pathways change by using NMR.

Medical applications of service

- Identification of target metabolites including lipoprotein, phosphocholine, lactate, pyruvate, glucose, amino acids, and creatinine for the assessment of chronic liver failure.
- Determination of trimethylamine N-oxide (TMAO) is associated with alcoholic liver disease progression.
- Assessment of serum metabolic profiling of serine, glycine and methionine in acute-on-chronic liver failure.

Drug and biopharma applications of service

- Investigation of drug metabolites to study toxicological effects and pharmacokinetics.
- Monitoring of metabolic profile changes occurring in plasma and tissues before and after drug treatment.

Examples of research utility of service

Drug and biopharma	- Characterization of hepatic fatty acids for treatment response to metformin. (Begoña Lavin, 2023.)
	- Metabolomics study of the toxicological effects induced by traditional medicine. (Can Xu, 2017.)
Medical applications	- Monitoring metabolomic changes for alcoholic liver disease progression. (Junsang Oh, 2024)
	- Assessment of chronic liver failure by metabolomic approach. (Roland amathieu, 2011)

3. Kidney function panel

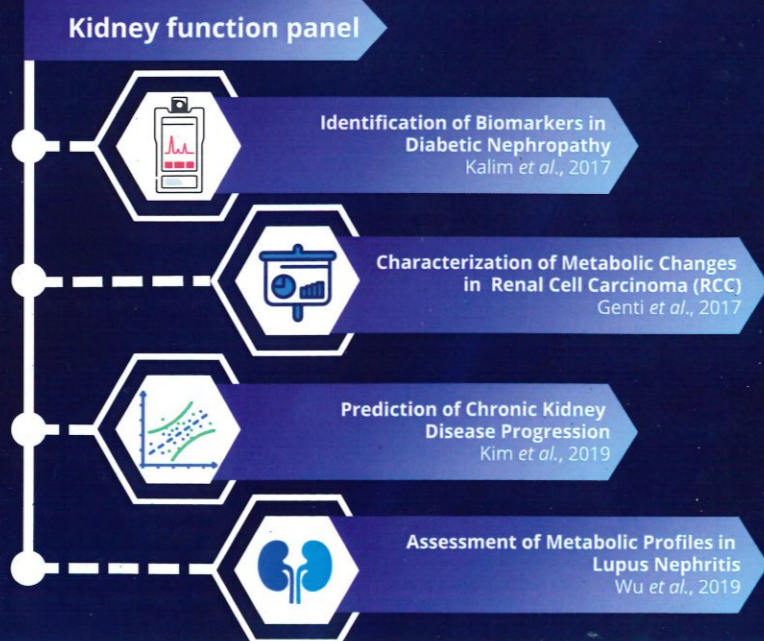
A Kidney Function Panel employs metabolomics to measure biomarkers like creatinine, urea, and fatty acids, offering a comprehensive assessment of kidney health. By analyzing these markers in blood or urine, it aids in diagnosing, monitoring, and treating kidney conditions with precision. This approach enables ongoing evaluation of renal function, providing valuable insights into overall kidney health status.

Aid in diagnosis, monitoring disease progression, and guiding personalized treatment strategies for kidney-related conditions.

Precise measurement of kidney function biomarkers.

Targeted metabolomics analysis of kidney health

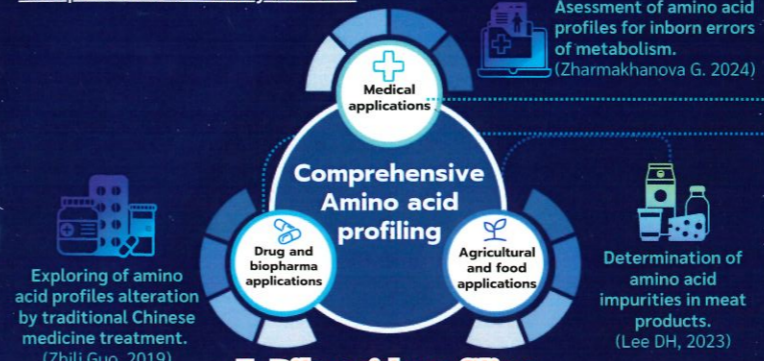
Insights into specific metabolic pathways associated with kidney dysfunction.



4. Comprehensive amino acid profiling

Amino acid profiling via LC-MS facilitates the identification of potential biomarkers. This method can detect and monitor amino acids, characterize foods and ingredients, and describe amino acid metabolism. Including analysis of amino acid composition in plants and fruits. It can also be used to do QA and QC for various quality enhancements.

Medical applications of service	Drug and biopharma applications of service	Agricultural and food applications of service
<ul style="list-style-type: none"> • Discovery of amino acids profiles • Recommended for the following disorders <ul style="list-style-type: none"> - Inborn errors of amino acid metabolism, Autism Spectrum Disorders, Behavioral disorders, Cardiovascular problems, Depression, Dermatitis, Chronic fatigue, GI problems, Inborn errors of metabolism, Kidney stones, Muscular weakness, OCD, Osteoporosis, Poor immunity 	<ul style="list-style-type: none"> • Drug Metabolism Studies • Pharmacokinetic Studies • Branched-chain amino acids (BCAAs): Leucine, Isoleucine, Valine • Quality Control in Biopharmaceuticals 	<ul style="list-style-type: none"> • Amino acid profiling in functional food and ingredient • Amino acid profiling in feed • Amino acid profiling in supplement products • QC and QA supplement food production • Analyze the composition of the amino acids in plant and fruit components



5. Bile acid profiling

Bile acids, diverse in shape and function, aid digestion and act as signaling molecules in circulation. They regulate tissue receptors and are modified by gut microbes, impacting health. LC-MS based Bile acid profiling, with its precision, distinguishes between similar bile acids, revealing their roles in health and disease.

Medical applications of service

- Diagnosis of Inborn Errors of Bile Acid Metabolism
- Evaluation of Liver Diseases:
- Assessment of Intestinal Diseases and Malabsorption:

Drug and biopharma applications of service

- Biomarkers for diseases and drug responses
- Identifies therapeutic targets
- Personalized treatment strategies.

Agricultural and food applications of service

- Livestock health monitoring

6. Neurotransmitter profiling

Neurotransmitters play crucial roles in communication within the nervous system. Neurotransmitter profiling with LC-MS separates, identifies, and quantifies neurotransmitters and their metabolites present in biological samples such as blood, cerebrospinal fluid, or tissue extracts. Neurotransmitter levels can provide valuable insights into various aspects of health and behavior.

Medical applications of service

- Quantifying neurotransmitter concentration alterations
- Disease Monitoring and Prognosis
- Treatment Selection and Personalized Medicine

Drug and biopharma applications of service

- Identify potential drug targets
- Efficacy and Safety Testing
- Biomarker Discovery
- Mechanism of Action Studies

Agricultural and food applications of service

- Nutritional Analysis by identifying unique neurotransmitter profiles associated with specific food sources

ADRENALINE Fight or flight neurotransmitter	NORADRENALINE Concentration neurotransmitter
DOPAMINE Pleasure neurotransmitter	SEROTONIN Mood neurotransmitter
GABA Calm neurotransmitter	ACETYLCHOLINE Learning neurotransmitter
GLUTAMATE Memory neurotransmitter	ENDORPHINS Euphoria neurotransmitter

7. Short-chain fatty acid profiling

SCFAs profiling, including acetate, propionate, and butyrate, has numerous medical applications. Produced by the gut microbiota, altered SCFAs levels are associated with gastrointestinal, metabolic, and neurological disorders. This profiling helps researchers and clinicians understand the gut microbiome's role in health and disease, potentially leading to new diagnostic and therapeutic approaches.

Medical applications of service

- Monitoring of the efficacy of dietary interventions or probiotic therapies
- Monitoring of gut structure and function in patients with intestinal dysfunction
- Disease diagnosis

Drug and biopharma applications of service

- Monitoring a drug's efficacy
- Microbiome-targeted therapeutics
- Evaluating gastrointestinal or metabolic side effects of drugs during development

Agricultural and food applications of service

- Development of prebiotics, probiotics, and specialized animal feeds.
- Detection of microbial spoilage and contamination in food
- Quality control in food production process (cheese, yogurt, and pickles production etc.)

8. Gut health checkup

Gut microbiota plays a major role in digestion, vitamin synthesis, immune system development, and ion absorption for humans. The microbiota plays a major role in health and disease in humans. Gut health checking up can help you to know dysbiosis, candida overgrowth, and health problems. Then, you will target dietary changes, supplements, probiotics, or other therapies to help restore optimal gut function and microbiome balance.

Medical applications of service

- Disease diagnosis
- Checking microbiota balance
- Beneficial and harmful bacteria in your gut

Drug and biopharma applications of service

- Drug development
- Personalized Medicine
- Gut microbiome analysis for drug treatments

Agricultural and food applications of service

- Food development for gut microbiota
- Probiotic development
- Food safety evaluation



9. Dysbiosis index testing

Dysbiosis index testing involves the analysis of microbial communities in various environments, such as the human gut, soil, water, or clinical samples, to assess the imbalance or dysbiosis in the microbial composition.

Medical applications of service

- Gut microbiome analysis
- Diagnostic biomarker discovery
- Therapeutic monitoring

Drug and biopharma applications of service

- Personalized medicine
- Drug efficacy assessment
- Bioprocess optimization

Agricultural and food applications of service

- Microbial spoilage detection
- Probiotic development and evaluation
- Optimizing food fermentation efficiency

