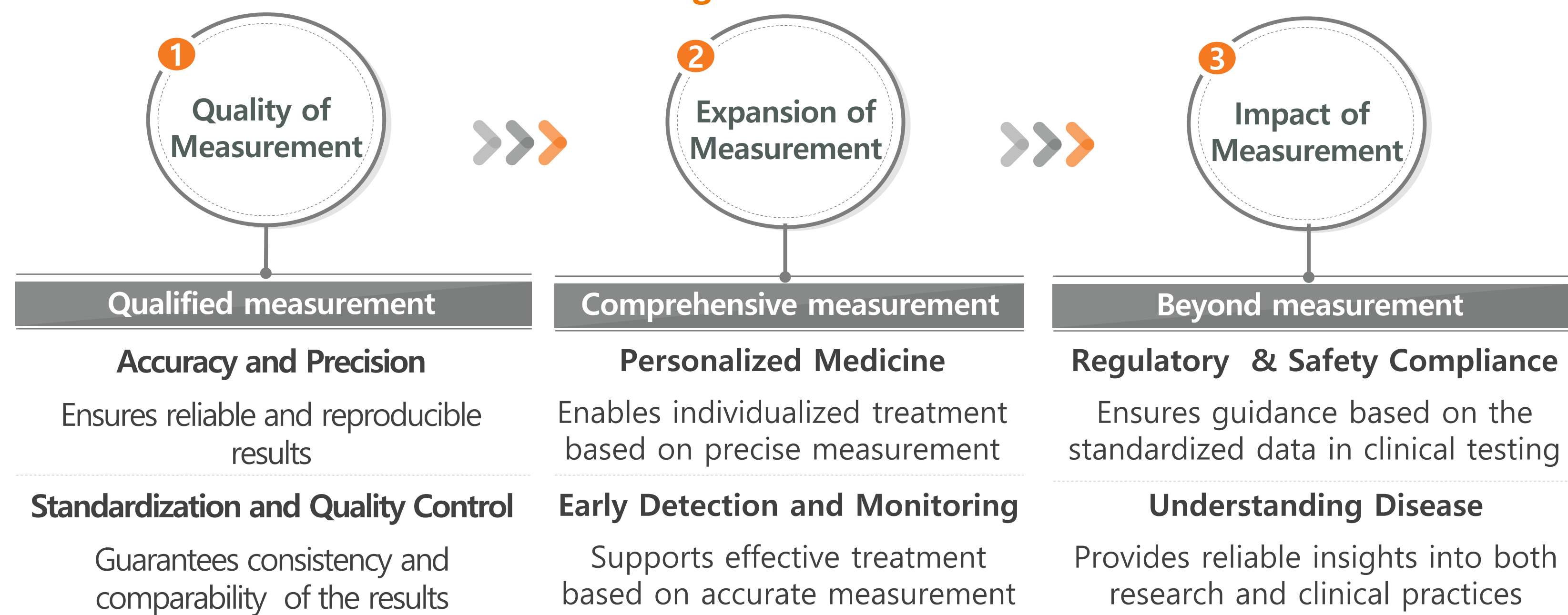


Innovative Organic Metrology for Clinical Diagnostics: Challenges and Opportunities towards Telemedicine, AI, and Preventive Healthcare

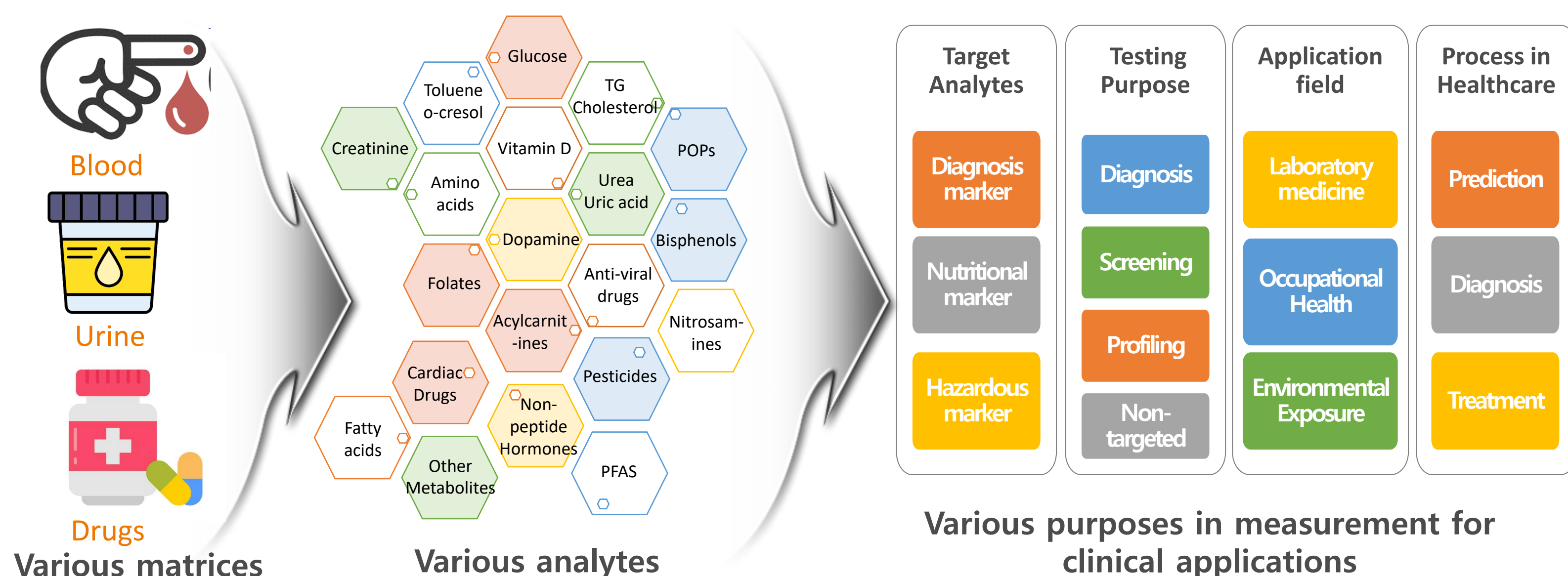
Name Ji-Seon Jeong*, Ha-Jeong Kwon, Seonghee Ahn, Song-Yee Baek, Jae Hyun Lee, and Kihwan Choi
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Measurement and Clinical Diagnosis and Healthcare

• Measurement matters in clinical diagnosis and healthcare



• Organic metrology for essential biomarkers in common health



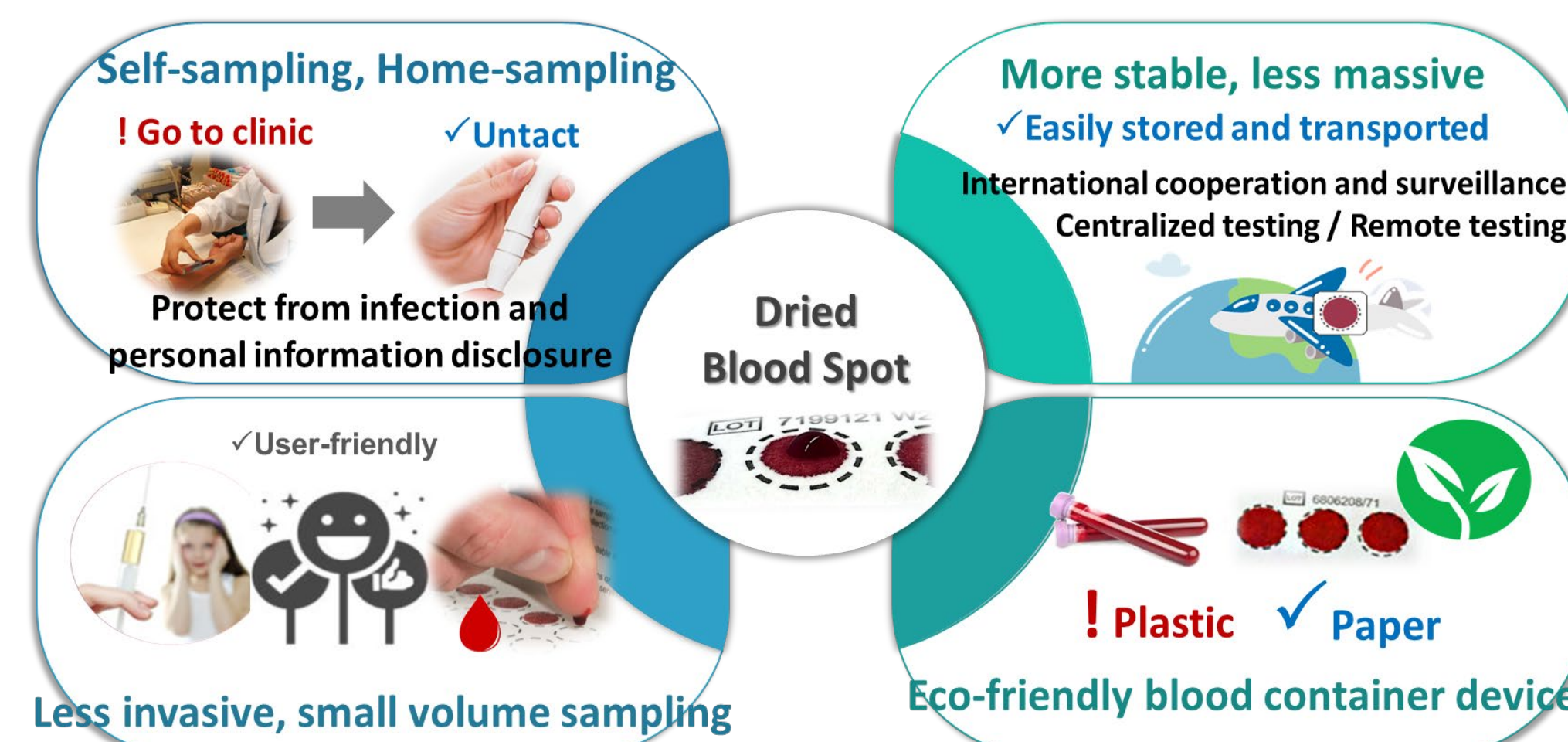
Footprint of KRISS in Organic Metrology for Healthcare

• Development of measurement standards for clinical testing

- Development of reference measurement procedures to establish international equivalency as an NMI in Korea
- Development and distribution of certified reference materials to establish of a reference measurement system in Korea

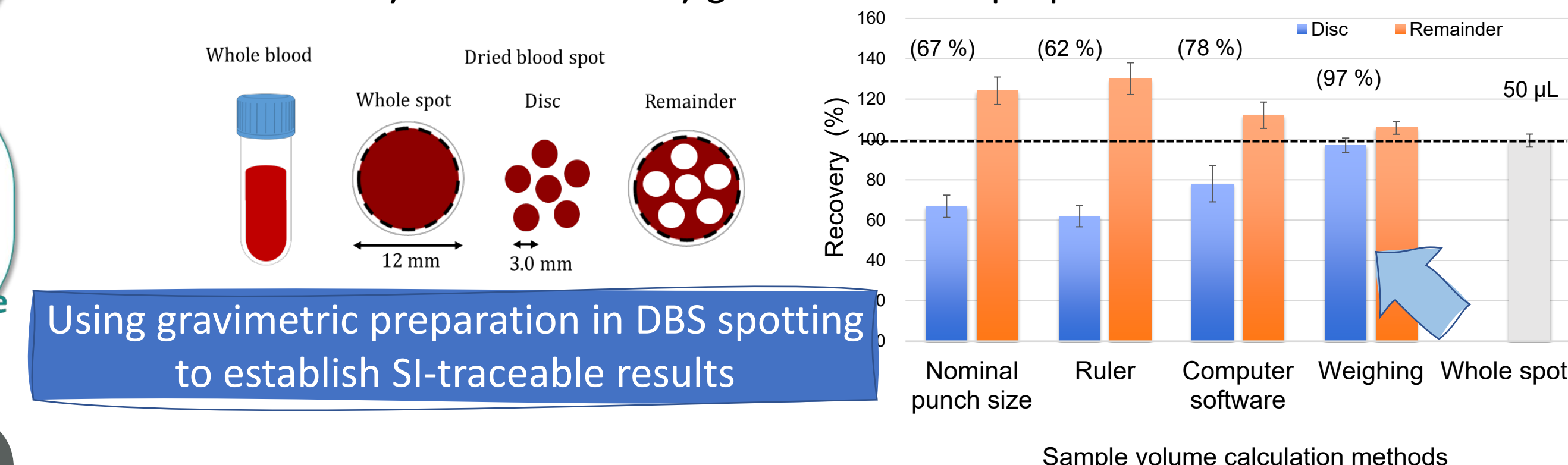


Telemedicine through microsampling



• Development SI-traceable CRM for amino acids and monosaccharides in dried blood spot

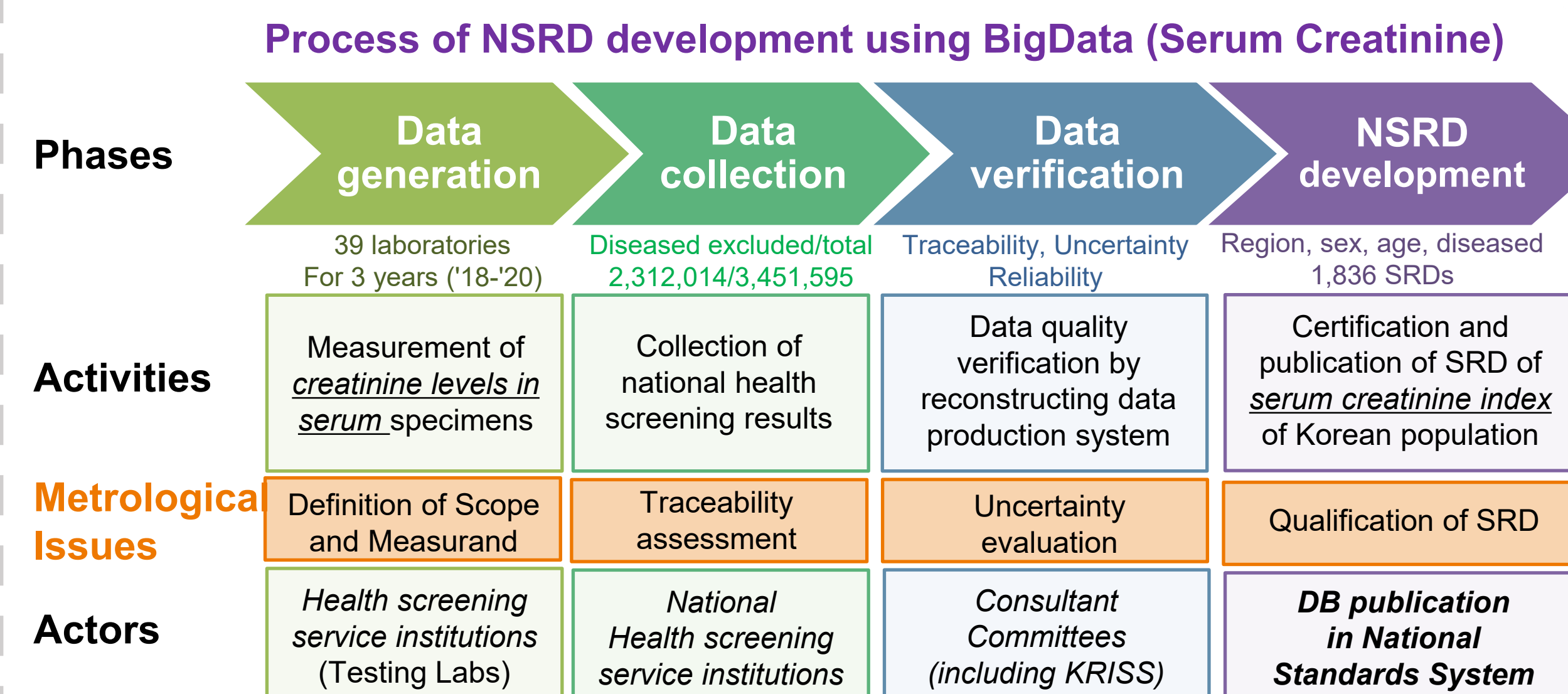
- Assessed the actual sample size and defined the bias factor in common DBS testing by gravimetric approaches
- Target metabolites in newborn screening were certified in the DBS samples and SI-traceability was achieved by gravimetric DBS preparation



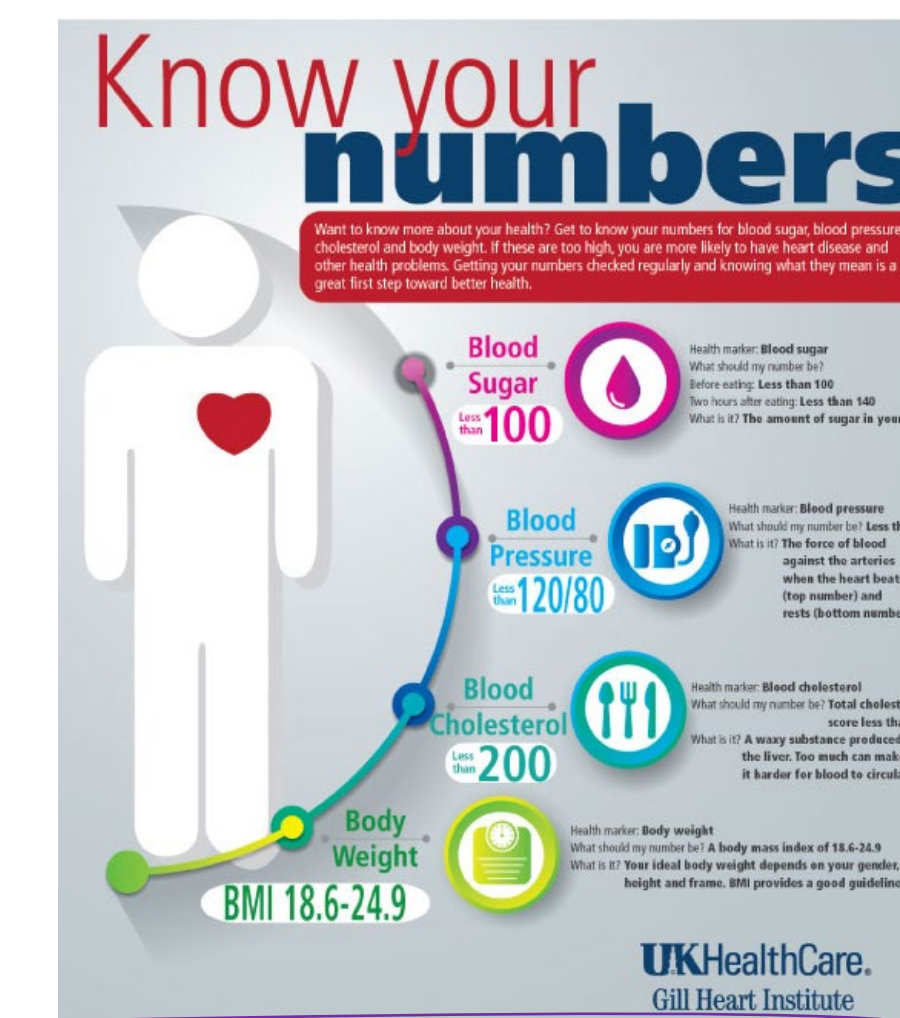
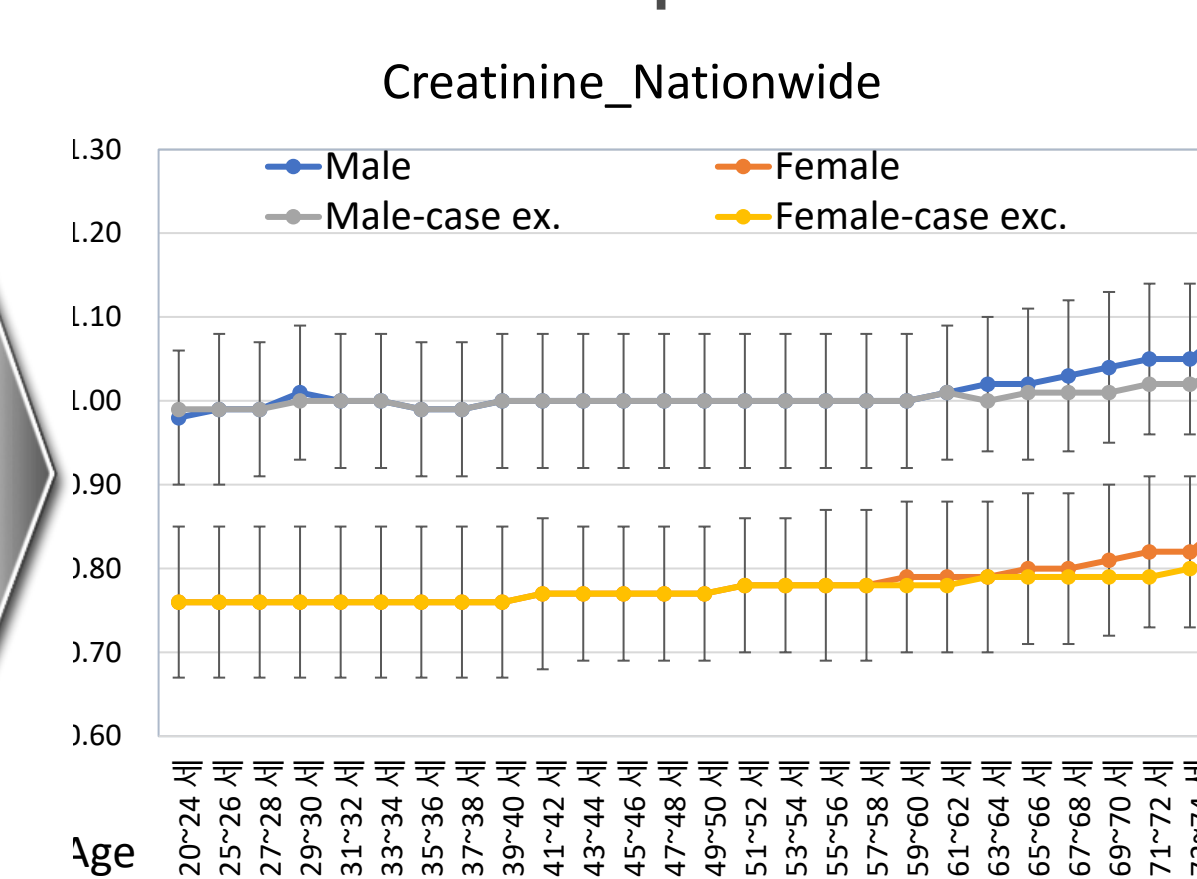
AI technologies through reference data

• Development National Standard Reference Data based on the accuracy-based clinical testing using CRM and uncertainty estimation

- Use data resources accumulated by National General Health Screening Program in Korea with confirmation of measurement traceability and uncertainty



DB distribution as public resources

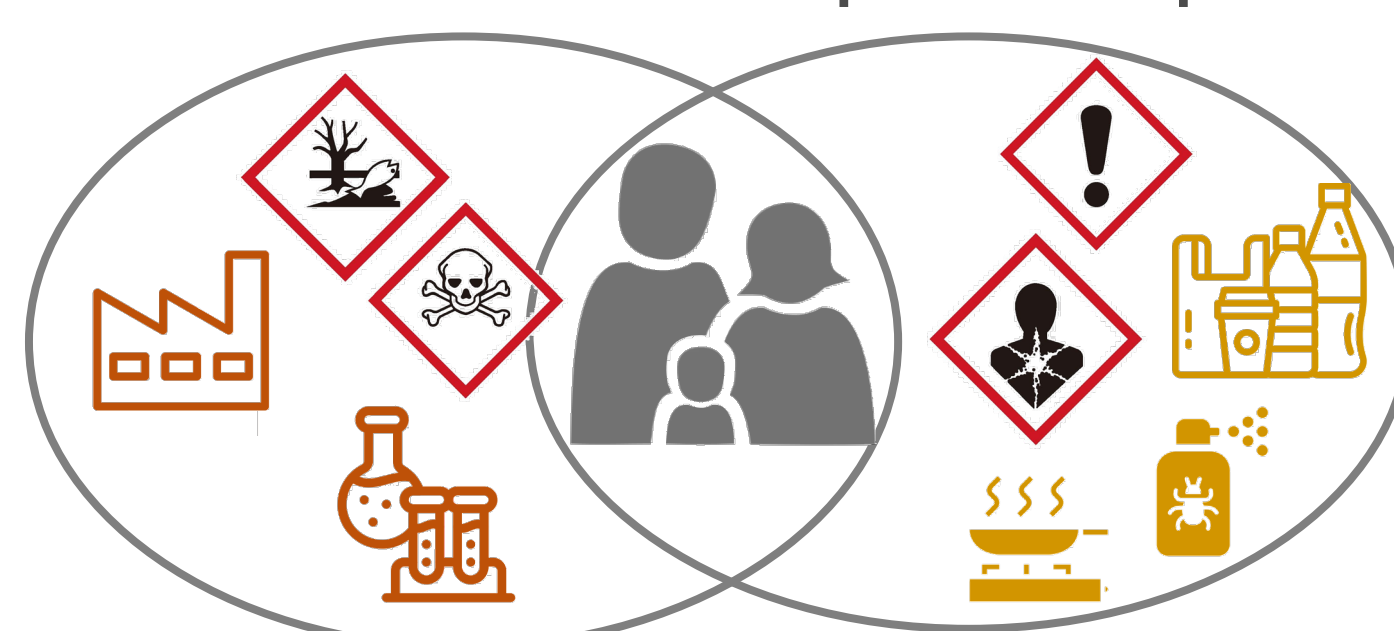


Reference Data for Clinical research/IVD Industry/Personal QoL

Preventive healthcare through environmental care

• Development of a reference measurement system for biomonitoring in environmental hazardous exposure

Environmental and Occupational Exposure



Hazardous chemical residues in blood and urine

- Beyond diagnosis, active prevention through biomonitoring of environmental hazard exposures based on legal requirements
- The need to improve measurement quality for occupational medicine and national environmental health surveys
- Development of CRMs for calibrators and QC materials in testing laboratories:
 - Artificial Urine for occupational medicine (o-cresol, hippuric acids, Pb, Cd, etc.)
 - Human urine and blood for trace-level of chemical hazards (pesticides, POPs, etc.)

CRMs for improvement of measurement quality in monitoring of chemical residues in clinical samples healthcare



Reference

- [1] For amino acid analysis : Kim J, et al. Journal of Chromatography B 1055-1056, 72-80 (2017), DOI: 10.1016/j.jchromb.2017.04.027.
- [2] For monosaccharide analysis : Seo MS, et al. Analytical Bioanalytical Chemistry 413, 5517-5527 (2021), DOI: 10.1007/s00216-021-03537-8.
- [3] For development of dried blood spot CRM : Woo S, et al. Analytical chemistry 94, 10127-10134 (2022), DOI: 10.1021/acs.analchem.2c01349
- [4] For figure of 'know your numbers' : <https://ukhealthcare.uky.edu/>
- [5] For figure of 'One health by WHO' : <https://www.who.int/europe/initiatives/one-health>



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