

Title of Research:

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Development of novel screening system to predict the effects of environmental factors in each organ by using cell-free circulating DNA in serum -- Advanced system for prediction of hazards from environmental factors in fetus using cell free fetal DAN in mother's blood

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Summary of Research:

Detecting organ injury (e.g. by toxins or chemicals) at earlier stage is important to prevent the adverse outcomes. For such purpose, we have developed a novel screening system using serum. This system is simple and minimally invasive, because we utilized serum to detect cell free circulating DNA (cfDNA), whose origin may be identifiable if they harbor tissue-specific epigenetic modification. Furthermore, our system may have a potential to detect fetal organ injury if cfDNA of fetal origin in maternal serum is identifiable. Previously, we identified and selected several candidate regions as the adult and fetal organ-specific markers (specific un-methylated regions). In this term, first, to confirm whether these regions harbor tissue-specific epigenetic modification, we performed bisulfite amplicon sequence (BSAS) assay with genome DNA, derived from several fetal tissues. Second, we produced organ-specific injury mouse model using chemical exposure. We could detect cfDNA harboring each organ-specific nature. The level of such organ-specific cfDNAs increased with the increase in chemicals causing organ-specific injury. These results indicate that our system may be useful to detect specific injured organs just by using serum.

Timeline:

March 1, 2018 – February 28, 2019

Topics:

Poster presentation at 2018th JCIA LRI Annual Workshop, title: Development of novel screening system to predict the effects of environmental factors in each organ by using cell-free circulating DNA in serum

Publications:

- Poster presentation at 21st Japan Society of Endocrine Disruptors Research Annual Meeting, title: Development of novel screening system to predict the effects of environmental factors in each organ by using cell-free DNA in serum
- Oral presentation at 89th The Japan Society for Hygiene Annual Meeting, title: Development of a novel screening system to predict injured organs using cell-free DNA in serum