Jae-Ho Park et al., J Food Nutr Disord 2017, 6:3(Suppl)
DOI: 10.4172/2324-9323-C1-003

11TH European Nutrition and Dietetics Conference

June 29-July 01, 2017 Madrid, Spain

Global analysis of DNA methylation in hepatic steatosis induced by oleic acid

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In this study, we investigate the effects of DNA methylation on lipid accumulation in hepatic steatosis model induced by oleic acid. To determine the status of DNA methylation, reduced representation bisulfite sequencing (RRBS) was carried out and more than 20 million reads of each sample were analyzed with BS-seeker2 and bowtie2. Loci having less than 5 reads were excluded from the analysis. Mappability of the paired end was above 70% and depth was over 40 in all samples. To compare the DNA methylation, only CpGs but not CHH, CHG in 100 bp window were statistically calculated with 50 bp sliding. We found that 406 loci in hepatic steatosis model (OA) were hyper- and hypo-methylated compared to control (N) cells (DMR (differently methylated region) > 20%, $p < 0.01$). In addition, treatment with Allium ubersorum (Bu) or Capsella bursa-pastoris (Naeng) also regulated DNA methylation in the lipid-accumulated cells. The genomic structure of the differently methylated regions were exon (15-25%), CpG island (18-19%), intron (9-20%), repeates (18-20%), transcription start site (2-7%). After comparing the DMR in 3 groups, total 75 putative loci were selected. We found that 29 loci were hypermethylated in OA but hypomethylated in the group of treatment with Bu or Naeng. Conversely, 45 loci were hypomethylated in OA but hypermethylated in Bu or Naeng groups. These result suggested that DNA methylation affect lipid accumulation and Bu and Naeng modulate the DNA methylation and affect the lipid accumulation in the oleic acid-induced steatosis model.

Biography

Jae-Ho Park is a molecular biologist and geneticist. He received a Bachelor of Science degree in biology in 1996 and received his M.S. in biology in KAIST. He attended Mount Sinai School of Medicine NYU in New York, where he received his Ph.D. in Genetics and Genomic Science. His Ph.D. thesis was a study of the genetic and epigenetic disease and characterizing murine model. He joined the cardiovascular research group in Massachusetts General Hospital and investigated gene therapy to treat cardiac hypertrophy. He went back to Korea and continued his research in Korea Food Research Institute. He has his expertise in genetics and epigenetics in lipid-accumulated cell model and diet-induced murine model. His research is also focusing the physiological functions of olfactory receptors and their genetic regulations.

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