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Overdosed Vitamins Generated Epigenetic Changes to Intestinal Stem Cells

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Vitamin C and vitamin B3 have been extensively used in food and pharmaceutical industry. However, whether the oral abusing of vitamins will promote epigenetic changes in gastrointestinal tract is still unknown. In this study, high doses of vitamin C and vitamin B3 (600 and 1200 µg/ml) were used to study their epigenetic effects on four types of intestinal organoids representing different intestinal environments. It was discovered that there was a significant growth rate difference between 1200 µg/mL vitamin C and 600 µg/mL vitamin B3 treatment organoid groups. This trend was seen throughout all the different strains of mice. Furthermore, different concentrations for vitamins also had a significant cell viability variation for the different types of organoids. By comparing fold changes, majority of gene expressions were downregulated. However, some upregulations were shown for CD44 (cancer related) and PIK3CA (colorectal cancer related) for 129 ASF C600 group, which suggested vitamin C 600 µg/ml might promote cancer related signals. As we learn from these data, both C3H ASF and C3H Conventional organoids have shown more epigenetic changes towards higher concentrations of vitamin C and B3. However, using 129 ASF IL-10 mouse organoids as a model of inflamed intestine, it is surprised to see that high doses of vitamins did not suppress the proliferation rate as much as the other types of intestinal organoids. This study provides us a primary understanding of how intestinal mucosa undergo epigenetic changes with the exposure to intentional overdosed vitamins through oral administration.