

## Literature Case Study

### Background

A literature study<sup>1</sup> investigates the effects of strawberry seed oil and rapeseed oil under basal and obesogenic dietary conditions in relation to carcinogenesis and cardiovascular diseases. Epidemiological and experimental studies have shown that a high intake of n-6 polyunsaturated fatty acids (PUFAs) may promote, whereas n-3 PUFAs can suppress carcinogenesis; however, the exact mechanism responsible for these effects is unclear and may involve eicosanoid production, inflammation, and oxidative stress.

n-3 polyunsaturated fatty acids (PUFAs): alpha linolenic acid.

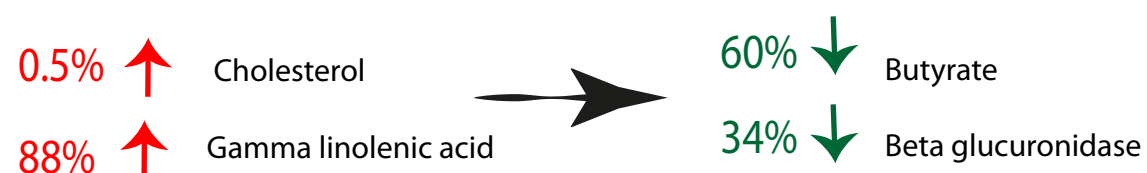
n-6 polyunsaturated fatty acids (PUFAs): Linoleic acid, gamma linolenic acid.

n-9 polyunsaturated fatty acids (PUFAs):oleic acid

### Summary Table

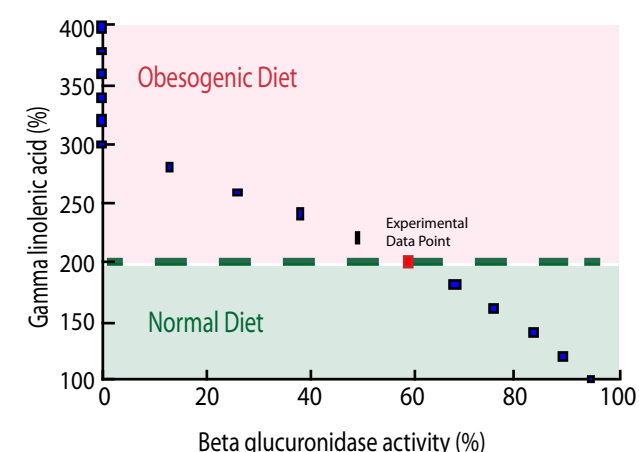
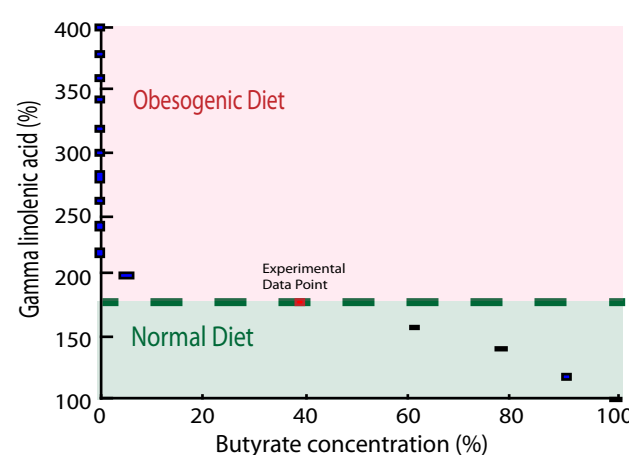
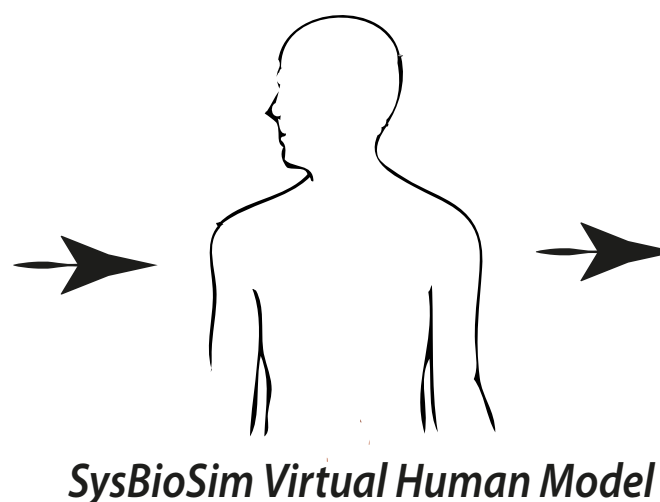
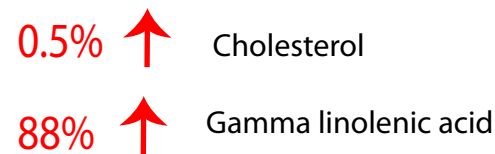
Metabolites, activities \ Rapeseed Oil	Basal	Obesogenic	Changes (Basal %)	Changes (Obesogenic %)
b-glucuronidase	22.5	15	100	66
Butyrate	28.3	11.2	100	40
<b>Input</b>				
cholesterol	0	0.5 (%)		
PUFA, n-6 (gamma linolenic acid)	1.41	2.65	100	188

### Rapeseed oil rich Obesogenic diet

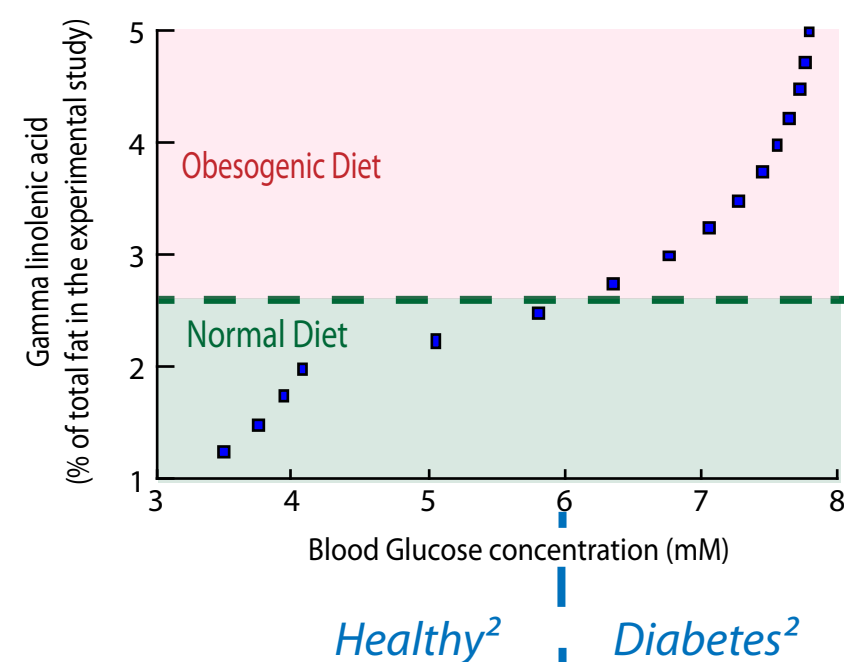


### Output Graphs

#### Input Changes



### Predictional Output Graph



### SysBioSim Simulation Results

The results based on our analysis and simulations focusing on rapeseed oil, not only display the same behavioral trend with the trends observed in the empirical work in the aforementioned study, but also demonstrate a direct correlation between n-6 PUFAs, cholesterol and b-glucuronidase activities and butyrate levels. In addition, we predict the effect of rapeseed oil rich obesogenic diet on diabetes, represented with blood glucose levels percentage-wise. Therefore, we can conclude that rapeseed oil rich obesogenic diet can lead formation of certain metabolites that can be related to putative indices of colon cancer which is in line with the findings of the study. We can also demonstrate an increase in blood glucose levels under rapeseed oil rich obesogenic diet conditions, which is an indicator of diabetes, as an addition to the findings of the study.

<sup>1</sup> Jurgoński A, Fotschki B, Juśkiewicz J. Dietary strawberry seed oil affects metabolite formation in the distal intestine and ameliorates lipid metabolism in rats fed an obesogenic diet. *Food & Nutrition Research*. 2015;59:10.3402/fnr.v59.26104. doi:10.3402/fnr.v59.26104.

<sup>2</sup> [http://www.diabetes.co.uk/diabetes\\_care/blood-sugar-level-ranges.html](http://www.diabetes.co.uk/diabetes_care/blood-sugar-level-ranges.html)