

## Starfruit Leaves as Glucose Absorption Inhibitor in Mice's Small Intestinal Epithelial Cells

Rifqi Y Muhammad<sup>1\*</sup>, Ramdan Panigoro<sup>2</sup>, Julius B Dewanto<sup>2</sup>

1. Faculty of Medicine, Universitas Padjadjaran, Sumedang 40363, Indonesia

2. Departement of Biochemistry and Molecular Biology, Faculty of Medicine, Universitas Padjadjaran, Sumedang 40363, Indonesia

\*E-mail: rifqiyanda@gmail.com

### Abstract

**Background:** Starfruit (*Averrhoa carambola*) leaves contain flavone derivatives that exhibit anti-hyperglycemic effects. This study aims to determine the effect of starfruit leaves in reducing glucose absorption in intestinal epithelial cells of mice. **Methods:** This study was done by performing perfusion on the small intestines of mice. The mice that were used in this study were divided into four groups. The control group was given glucose solution without infused starfruit leaves whereas, the remaining 3 groups were given 3 mmol (540 mg/dL) glucose solution with infused starfruit leaves of varying concentrations; 200, 400, and 600 mg/kg. Samples were collected at 0, 15<sup>th</sup>, 30<sup>th</sup>, 45<sup>th</sup>, and 60<sup>th</sup> minute. The sample was tested for glucose levels using spectrophotometry. **Results:** Test of significance showed a significant difference between the control group and the test group with  $p < 0.05$ . **Conclusions:** Starfruit leaves have a reduction effect towards glucose absorption in the small intestines in Wistar strains where the group using 600 mg/kg of infused starfruit leaves have the most significant effect as compared to other groups.

*Keywords: absorption, Averrhoa carambola, glucose, infusion, intestine small*

### Introduction

Studies about the usage of herbal based medicine to cure diseases has been done, including to decrease the blood glucose level.<sup>1</sup> Previously known that the mechanism of glucose absorption can occur in a few ways; from glucose diffusion and protein transport. There are two type in glucose's protein transport mechanism; Sodium-Glucose Transport Proteins (SGLT1) and Glucose Transporter 2 (GLUT2).<sup>2-4</sup> The mechanism of decreasing blood glucose could occur in a few ways. The fibers that are in herbal substances could inhibit glucose absorption.<sup>5-11</sup> Fibers are complicated to dissolve to smaller molecule because human's intestine is lack of enzyme that can dissolve the fibers. Hence, the monosaccharides that bond with the fiber are difficult to absorb in human's intestine.<sup>11</sup> Aside from that, there are certain active substances that have glucose inhibition activity in the intestinal epithelial cells.<sup>12,13</sup>

Starfruit leaves has flavone derivatives in the form of apigenin-6-C- $\beta$ -L-fucopyranoside (Figure 1) and apigenin-6-C-(2-O- $\alpha$ -L-rhamnopyranosyl)- $\beta$ -1-fucopyranoside (Figure 2) that has a potential of anti-hyperglycemic effect.<sup>1,14,15</sup> Even though it is known that starfruit leaves exhibits an anti-hyperglycemic effect, the molecular

mechanism of starfruit leaves in lowering the blood glucose level is still exactly unknown. However, on previous study conclude that starfruit's leaves infusion

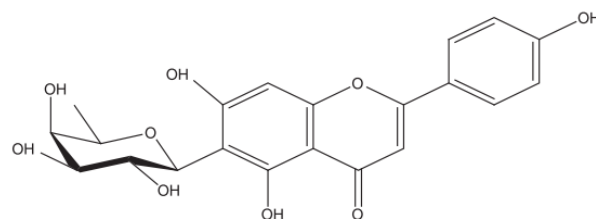


Figure 1. Apigenin-6-C- $\beta$ -L-fucopyranoside<sup>1</sup>

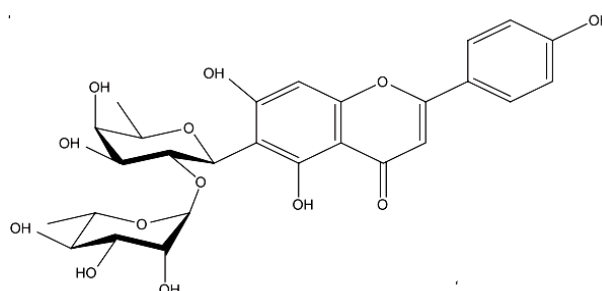


Figure 2. Apigenin-6-C-(2-O- $\alpha$ -L-rhamnopyranosyl)- $\beta$ -1-fucopyranoside<sup>1</sup>