

HAVE YOUR CARBS AND EAT IT

Understanding the link between diabetes, refined carbohydrates and dietary fibre, and how Alchemy Fibre™ can make your products healthier, and just as tasty.



ALCHEMY
Make Tasty Foods Healthier

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THE DIABETES EPIDEMIC

There are currently 463 million people with diabetes in 2019, and it is projected to increase to 700 million by 2045¹. 60% of diabetics live in Asia². 1 in 11 adults are living with diabetes³, a life-long chronic disease.

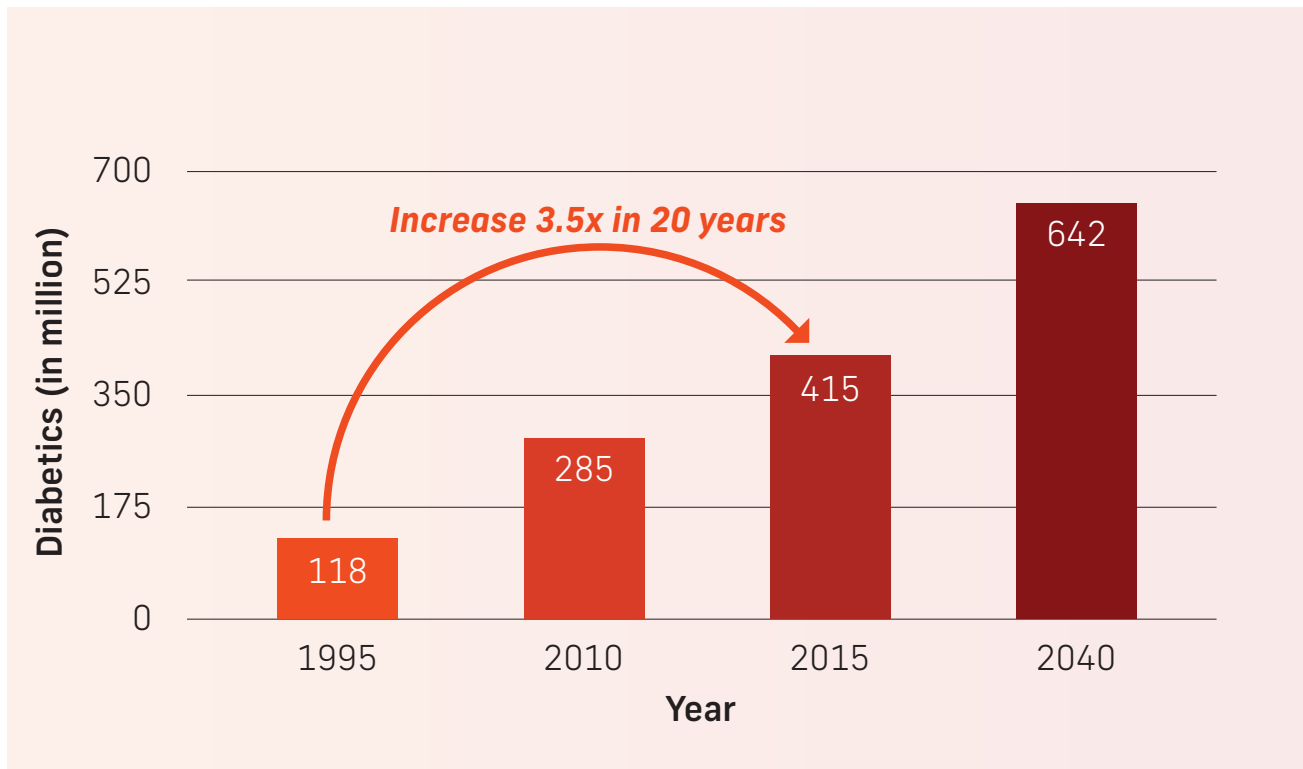


Figure 1: Diabetics numbers with years

Every 6 seconds, a death is caused by diabetes⁴.
Every 30 seconds, a foot is amputated due to diabetes⁵.
50% of people with diabetes die of cardiovascular disease⁶.
80% of 20-year diabetics suffers from diabetes retinopathy (loss of vision)⁷.

90% of people with diabetes suffer from type 2, which is influenced not only by genetics, but more importantly unhealthy diet and lifestyle. A combination of these factors can cause insulin resistance, when your body doesn't respond to insulin as well as it should. Insulin resistance is the most common cause of type 2 diabetes.

Insulin, a hormone made by the pancreas, helps glucose in the blood enter cells in the muscle, fat and liver, where it is used as a source of energy. Glucose comes from the food you eat. In healthy people, insulin lowers blood glucose to keep it in the normal range.

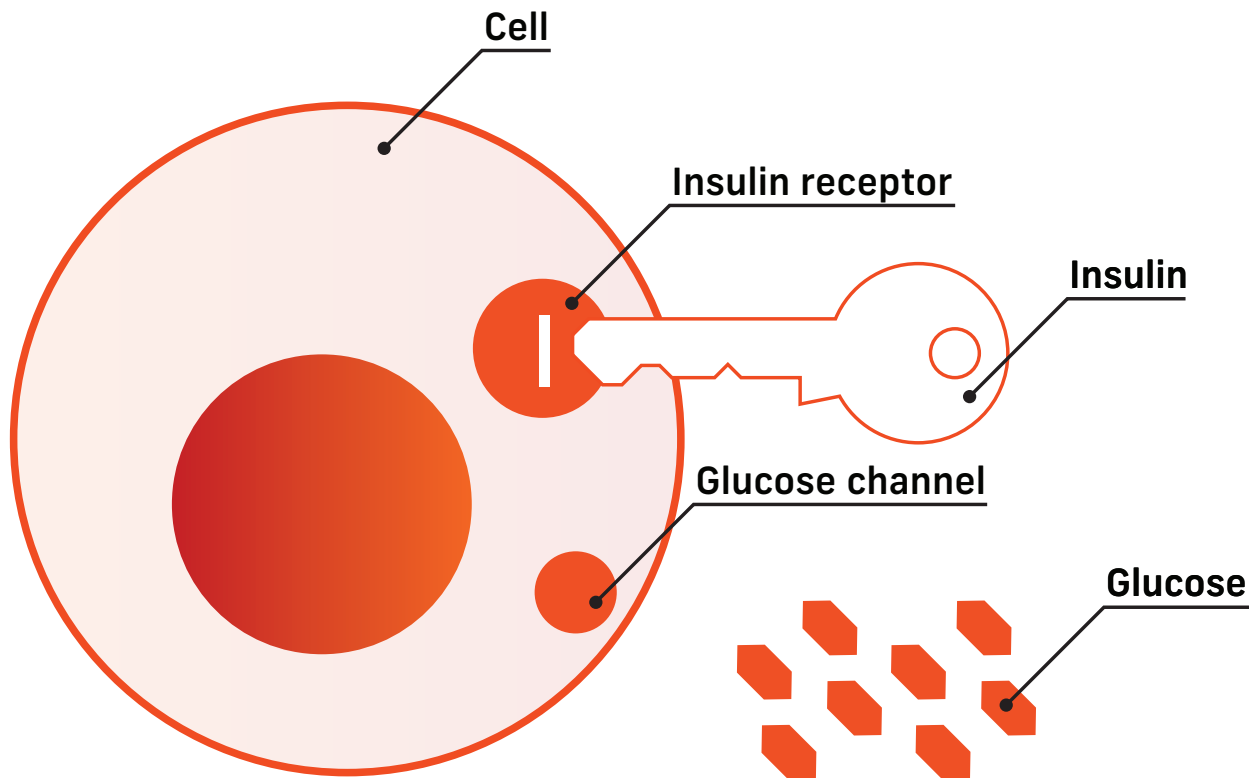


Figure 2: Insulin acts as a 'key' to allow glucose to enter the muscle cell

During a state of insulin resistance, insulin is ineffective as the cells no longer respond well to its effects. Initially, this prompts the body to increase insulin production to reduce rising glucose levels. When the blood glucose levels rise to above the accepted range, but below the level of diabetes, it is known as prediabetes. However, as the resistance builds up over time, a state of inadequate production of insulin can develop. Consequently, glucose cannot enter the muscle cells, and accumulate in the bloodstream, resulting in sustained high blood glucose levels (hyperglycemia) and type 2 diabetes.

Factors that can influence the risk of type 2 diabetes include:

- Obesity
- Poor diet and nutrition
- Physical inactivity
- Family history
- Ethnicity
- Smoking
- Past history of gestational diabetes mellitus (GDM)

REFINED CARBOHYDRATES & TYPE 2 DIABETES

Food is an integral part of us. It forms part of our behaviour, culture and lifestyle. As cities shift from rural to urban settings, people desire more refined foods, especially carbohydrates. White rice, white bread, refined noodles, cakes, cookies and biscuits have become our daily staple.

Despite knowing that whole foods and unrefined grains are better for us, dietary preferences has lead us to compromise health for taste. Additionally, refined carbohydrates are often perceived as comfort food, leading to further resistance to change. Unfortunately, refined carbohydrates are often 'empty calories' that provide us with little nutrients and are quickly broken down by the body into glucose. Recently, there has been an increase in consumer's preference for healthier options, challenging industries to come up with products that satisfy their taste buds, without compromising on nutrition.

Made with Alchemy Fibre™

Alchemy's patented blend, Alchemy Fibre™, is a plant-based ingredient that is a slowly digestible carbohydrate (SDC) and is high in dietary fibre. SDC helps to slow the release of glucose produced from the digestion of refined carbohydrates. Dietary fibre, especially prebiotic fibre that is found in Alchemy Fibre™, also helps to regulate blood glucose levels, increase immunity, promote heart health and gut health. Alchemy Fibre™ can be added easily to carbohydrate-rich food without changing its colour, taste and texture.

Alchemy Fibre™ is a white, free flowing powder. It can be easily applied and incorporated into a variety of products including bread, noodles, biscuits, cookies, cakes, steamed buns etc, by replacing a portion of the flour. FibreGrain™ is a rice-shaped grain made from Alchemy Fibre™. It is added to white rice in order to slow down its digestibility.

Slowing down the digestibility of carbohydrate-based foods is important for the prevention and management of diabetes. By adding Alchemy Fibre™, we improve the quality of the carbohydrate by as they digest slower than those without Alchemy Fibre™, based on an equivalent of 50 g of available carbohydrate, and this reduces the amount of glucose released from the food.

FIBREGRAIN™

CASE STUDY: Jasmine Rice

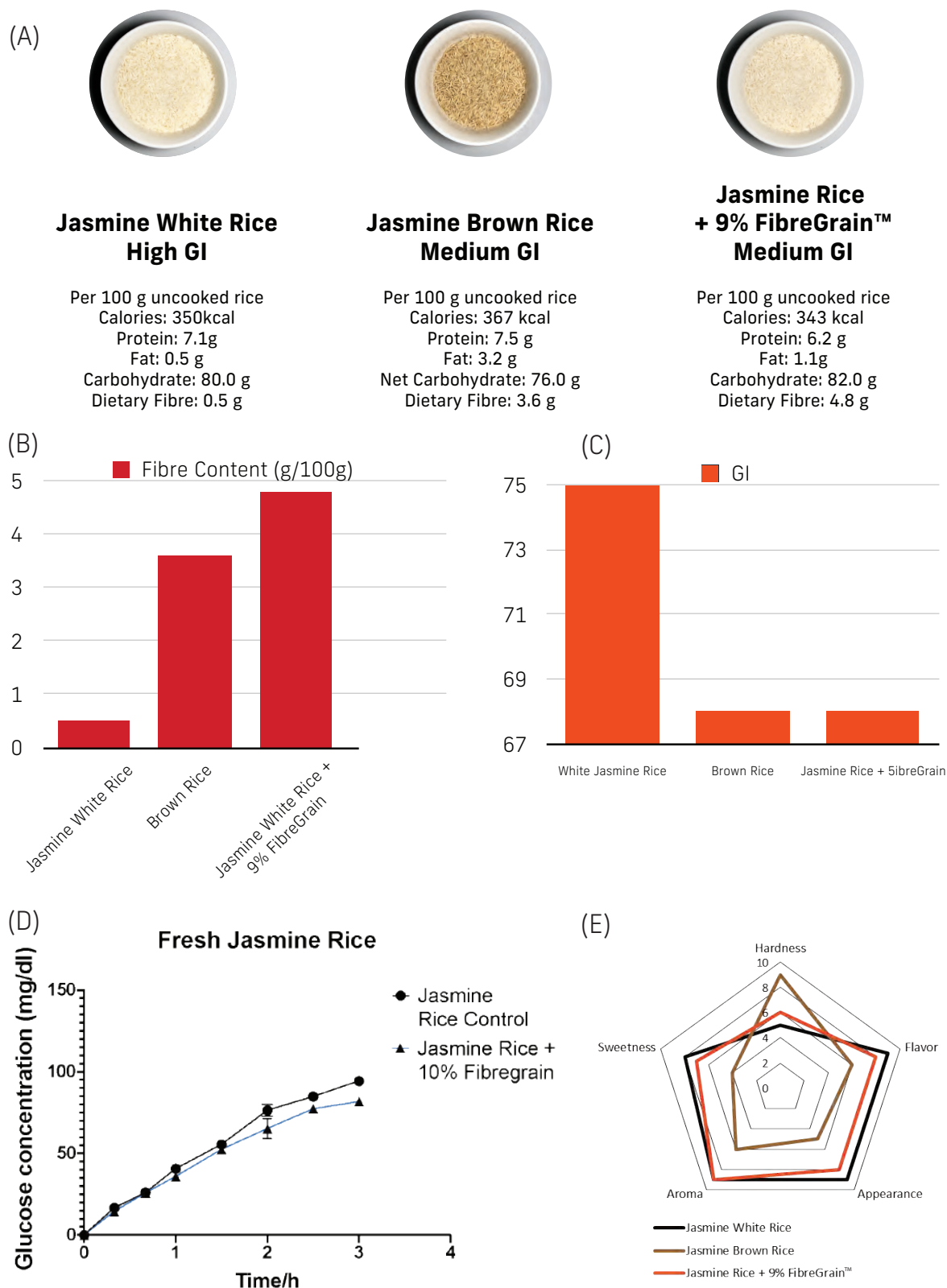


Figure 4: (A) Nutrition (B) Fibre content, (C) *In-vivo* GI, (D) *In-vitro* digestibility and (E) Sensory comparison between Jasmine White Rice, Brown Rice and Jasmine Rice + 9% FibreGrain™.

Jasmine Rice + FibreGrain™ has been clinically tested in human studies to lower GI of rice at 4% to 13% dosage levels (wet basis) at Sydney University Glycemic Index Research Service (SUGiRS) accredited lab under the ISO 2664:2010 standard



Figure 5: Appearance of a cooked bowl of Jasmine Rice + 9% FibreGrain™ (dry basis), or 4% FibreGrain™ (wet basis).

Jasmine Rice + 9% FibreGrain™ (dry basis, or 4% FibreGrain™ wet basis) has the same GI as brown rice measured *in-vivo*, and 10x more fibre than regular Jasmine white rice. Sensory assessments conducted with National University of Singapore, Food Science and Technology (NUS FST) revealed that 2/3 majority of the participants reported that its appearance and taste is similar to that of white Jasmine rice. This makes Jasmine Rice + 9% FibreGrain™ appealing to consumers who love eating white jasmine rice.

ALCHEMY FIBRE™

Alchemy Fibre™ is a free-flowing white powder that can be incorporated into a variety of refined carbohydrate-rich food, including Chinese steamed bun (pau), noodles, bread, cakes etc. Food with Alchemy Fibre™ have similar texture as control.

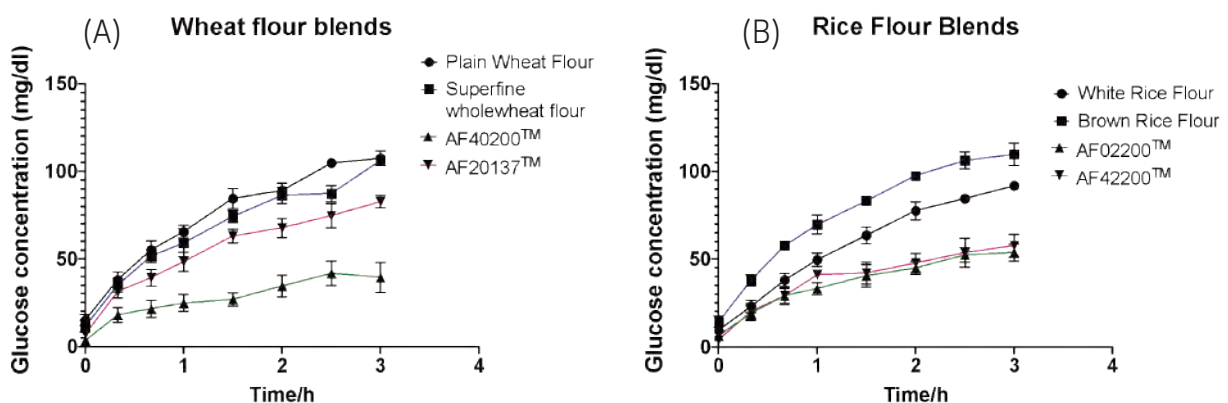


Figure 6: Rate of glucose production from the *in-vitro* digestion of wheat flour (A), and rice flour (B) and their

Alchemy Fibre blends have very low digestibility when compared to both their corresponding white and wholegrain flours. For example, Alchemy Fibre - Noodle/Cake showed a 62% reduction in digestibility when compared to plain wheat flour. On the other hand, superfine wholewheat flour showed a 9.2% reduction in digestibility when compared to plain wheat flour. Customisation of Alchemy Fibre for the right food application ensures that the digestibility of the food type of interest is reduced to that similar to wholegrain without changes in its appearance, taste and texture.

CASE STUDY (1): Jasmine white rice

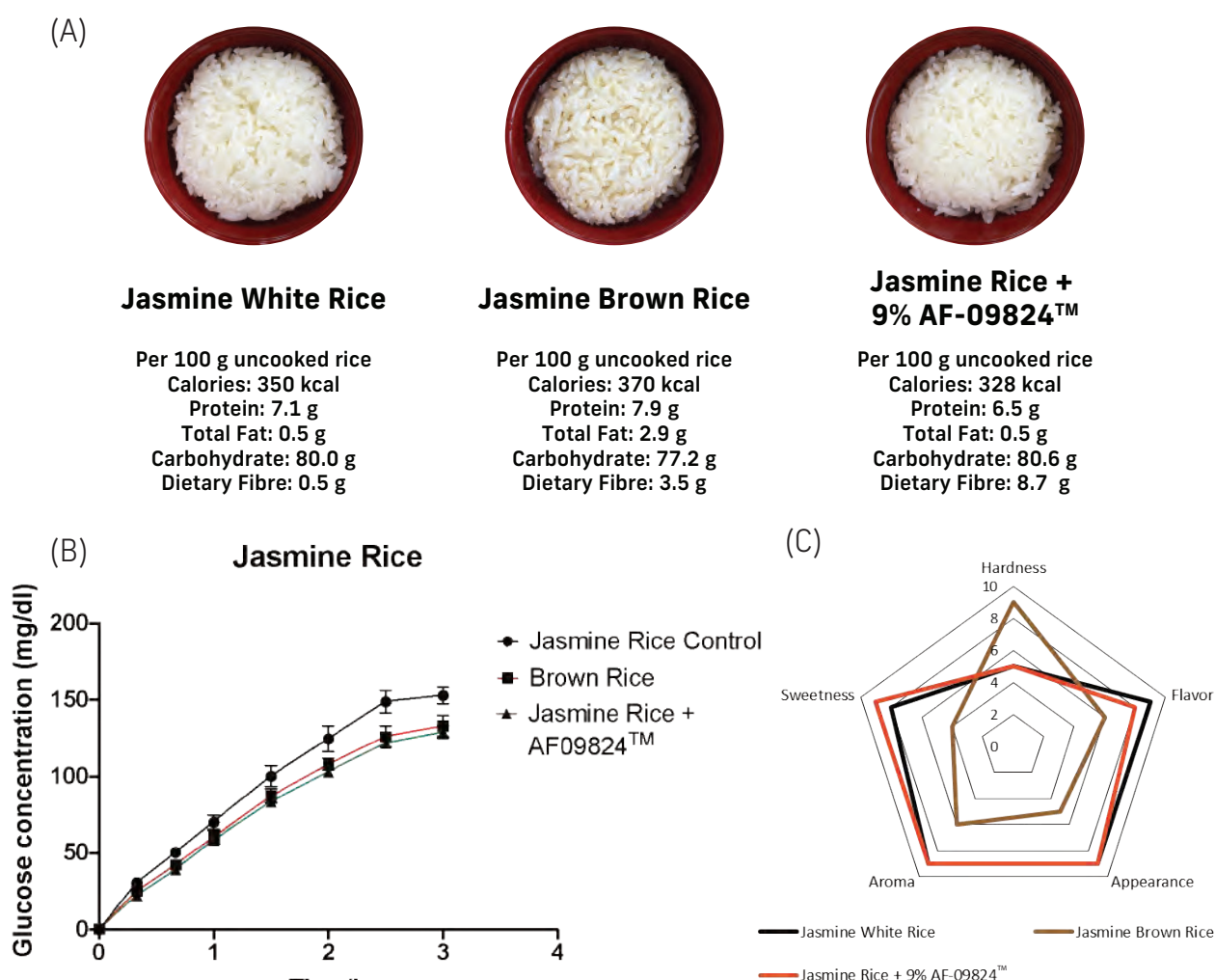


Figure 7: (A) Nutrition, (B) *In-vitro* digestibility and (C) Sensory comparison of of Jasmine White Rice, Jasmine Brown Rice and Jasmine Rice + 9% Alchemy Fibre™

Figure 7 shows that the addition of 9% of Alchemy Fibre™ to white jasmine rice does not change its appearance or taste and texture profile. Importantly, the addition of 9% Alchemy Fibre™ reduces the digestibility of white jasmine rice to that of brown jasmine rice. The fibre content is 12x more with Alchemy Fibre™, and 3x more compared to Jasmine Brown Rice.

CASE STUDY (2): White Bread

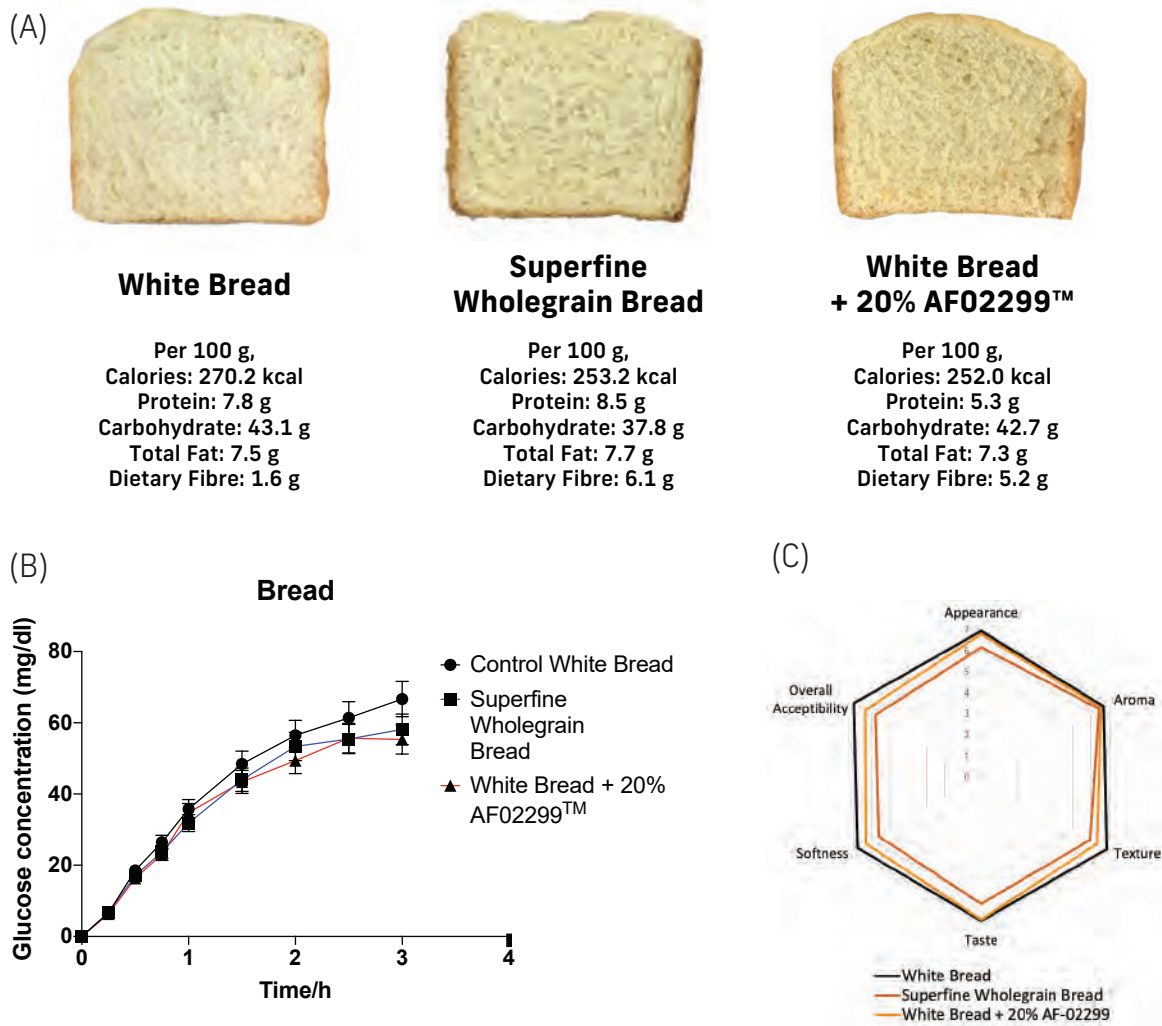


Figure 10: (A) Nutrition, (B) *In-vitro* digestibility and (C) Sensory comparison of White Bread, Superfine Wholegrain Bread and White Bread + 20% Alchemy Fibre™

Figure 10 shows that the addition of 20% of Alchemy Fibre to white bread does not change its appearance or taste and texture profile. Moreover, the addition of 20% Alchemy Fibre reduces the digestibility of white bread by 10.3%, more than 6.5% reduction in digestibility of wholegrain bread compared to control.

CASE STUDY (3): Steamed Bun

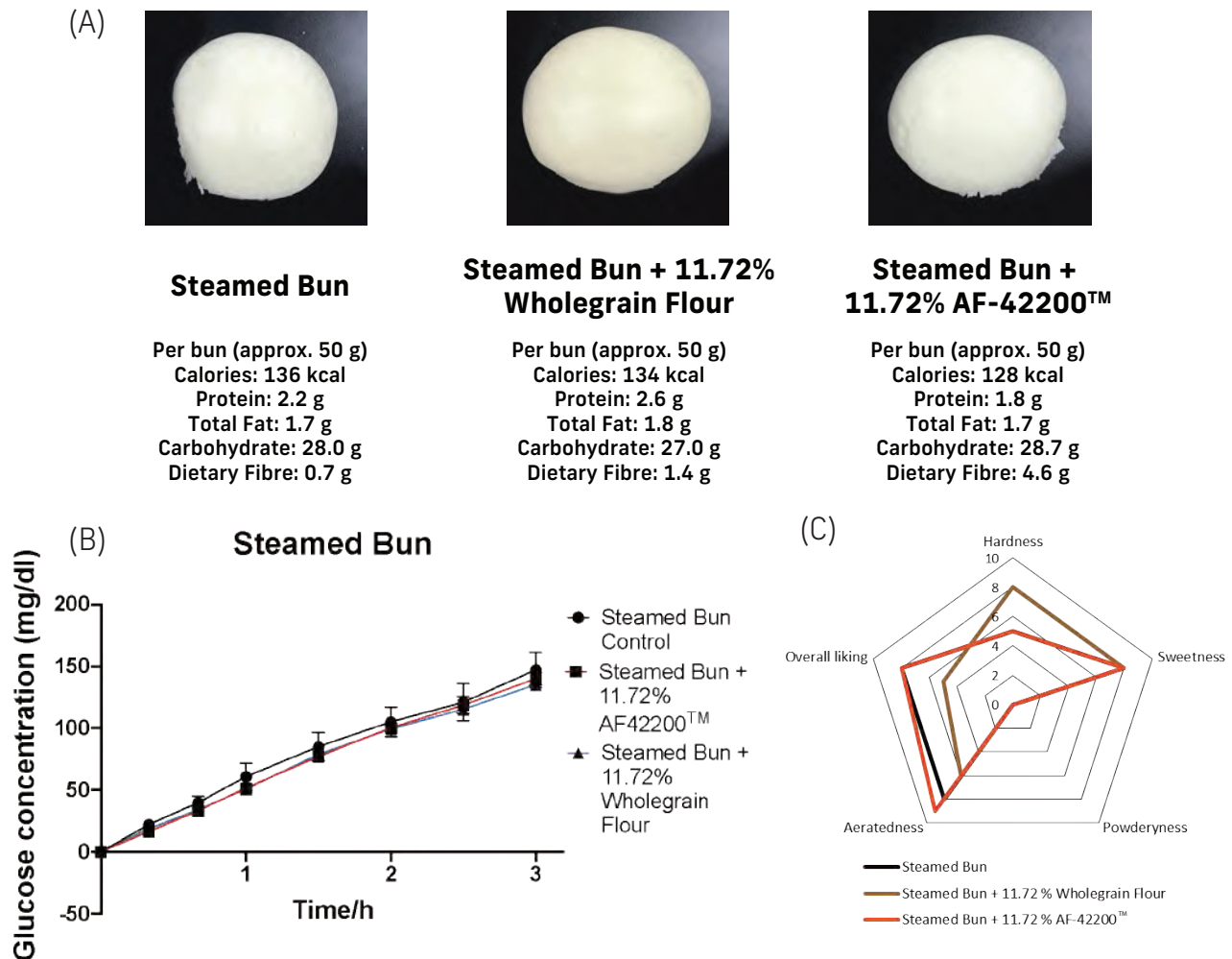


Figure 9: (A) Nutrition, (B) *In-vitro* digestibility and (C) Sensory comparison of Steamed Bun, Steamed Bun + 11.72% Wholegrain Flour and Steamed Bun + 11.72% Alchemy Fibre™

Figure 9 shows that the addition of 11.72% of Alchemy Fibre to steamed bun does not change its appearance or taste and texture profile. Moreover, the addition of 11.72% Alchemy Fibre reduces the digestibility of steamed bun to that of steamed bun with wholegrain flour, as well as increase the fibre content of white rice 6-folds.

CASE STUDY (4): Ramen

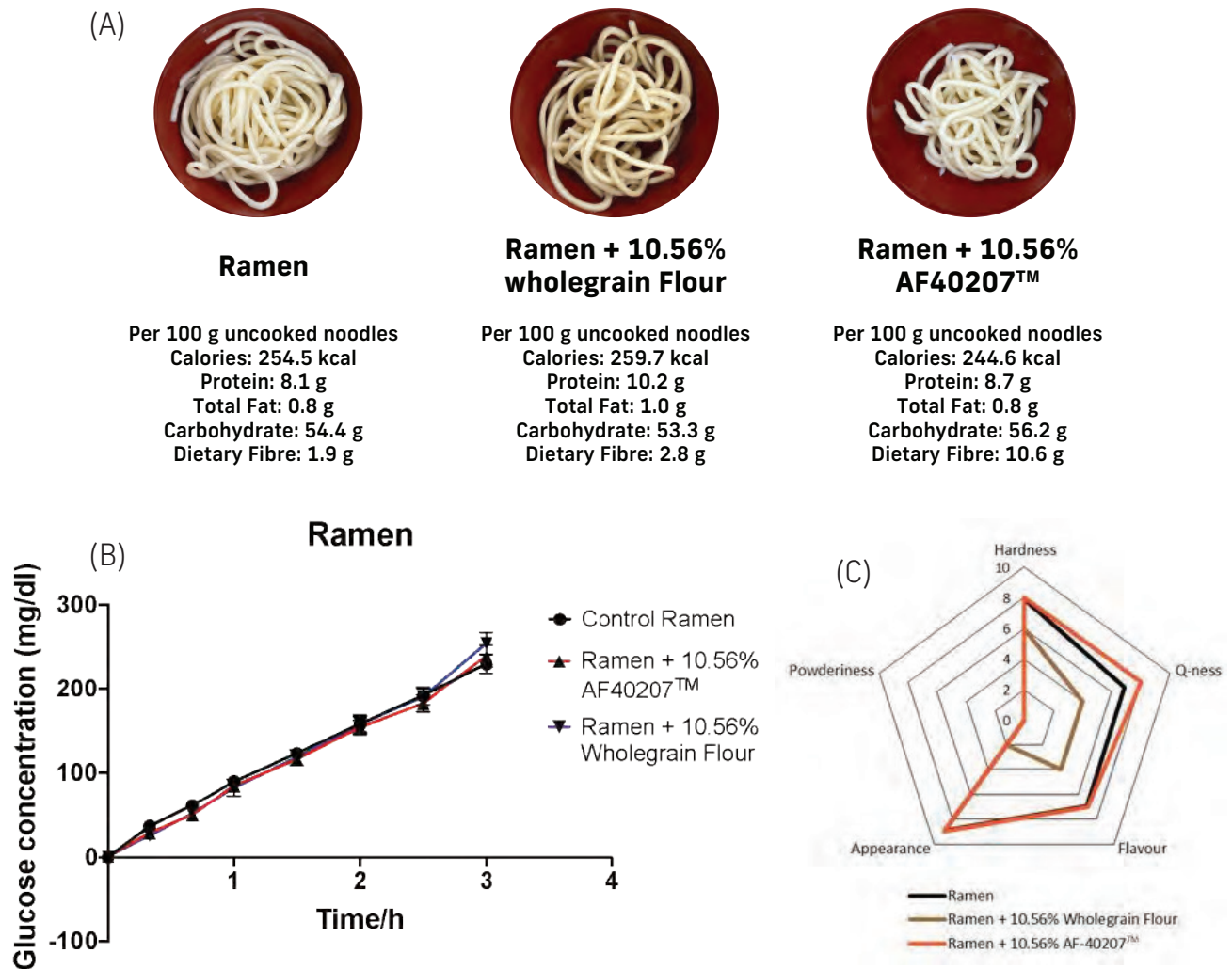


Figure 8: (A) Nutrition, (B) *In-vitro* digestibility and (C) Sensory comparison of Ramen. Ramen + 10.56% Wholegrain Flour and Ramen + 10.56% Alchemy Fibre 40207™

Figure 8 shows that the addition of 10.56% of Alchemy Fibre to ramen minimally changes its appearance or taste and texture profile. Moreover, the addition of 10.56% Alchemy Fibre reduces the digestibility of ramen by 4.5%.

CASE STUDY (5): Pandan Chiffon Cake

(A)



Pandan Chiffon Cake

Per serving (1 slice, approx. 63 g)
Calories: 234 kcal
Protein: 4.4 g
Fat: 15.2 g
Carbohydrate: 19.9 g
Dietary Fibre: 0.4 g



Pandan Chiffon Cake + 3.36% AF-42200™

Per serving (1 slice, approx. 63 g)
Calories: 231 kcal
Protein: 4.3 g
Fat: 15.1 g
Carbohydrate: 20.1 g
Dietary Fibre: 1.7 g



Pandan Chiffon Cake + 3.36% Wholegrain Flour

Per serving (1 slice, approx. 63 g)
Calories: 232 kcal
Protein: 4.6 g
Fat: 15.2 g
Carbohydrate: 19.5 g
Dietary Fibre: 0.5 g

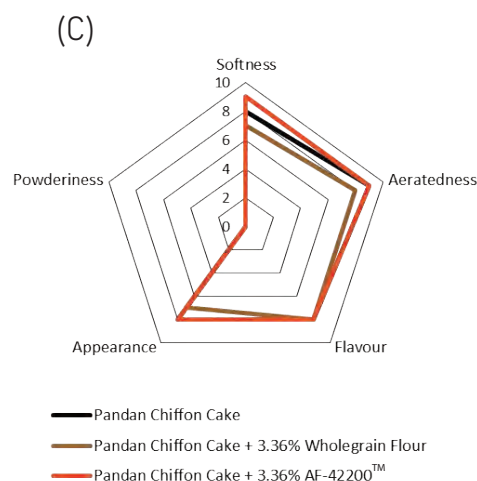
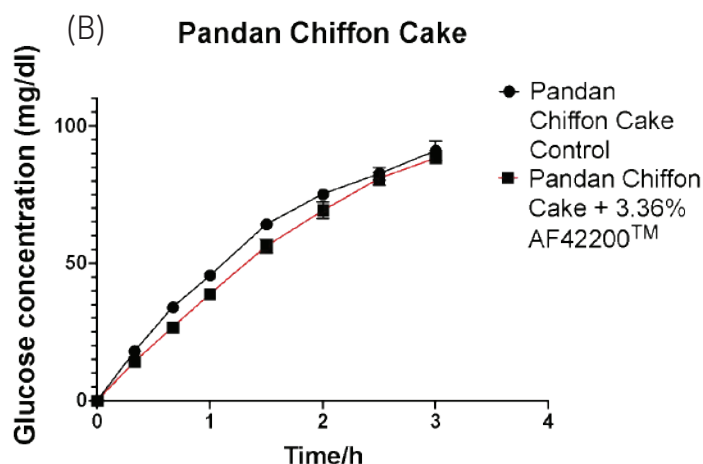


Figure 11: (A) Nutrition, (B) *In-vitro* digestibility and (C) Sensory comparison of Pandan Chiffon Cake and Pandan Chiffon Cake + 3.36% Alchemy Fibre™

Figure 11 shows that the addition of 3.36% of Alchemy Fibre to pandan chiffon cake does not change its appearance or taste and texture profile. Moreover, the addition of 3.36% Alchemy Fibre reduces the digestibility of pandan chiffon cake by 10.5%, as well as increase the fibre content of white rice 4-fold.

Table 1: In-vitro GI reduction and fibre claim of foods with the addition/replacement of 10-20% of Alchemy Fibre™/FibreGrain™

FOOD	In-vitro digestion reduction*	High fibre claim?
Jasmine Rice	17.8% reduction	Yes
Steamed Pau	7.3% reduction	Yes
Ramen	4.5% reduction	Yes
White Bread	5.1% reduction	Yes
Chiffon Cake	8.8% reduction	Only Higher in Fibre Claim

* Glycemic reduction may vary depending on the dosage of Alchemy Fibre™/FibreGrain™ added, the recipe and processing conditions of the product.

ALCHEMY INGREDIENTS

Every blend of Alchemy Fibre™ is different to cater to various food applications. At Alchemy, we ensure that our fibre will be best suited for your food application.

Taste is King!

Consumers buy into taste that they love, are familiar with, and are part of their culture and habits. With the diabetes epidemic, it is important that food manufacturers produce foods that are good for health, while not compromising on their products' taste and quality.

For example, many people know that eating unrefined foods are healthier for them. However, they prefer the taste and texture of refined food. Modern technologies have also allowed the production of refined foods at a low cost, making them widely available and the norm of food. It is evident that majority of consumers are unwilling to sacrifice taste for health.

Alchemy Fibre™ and FibreGrain™ has proven to be a useful ingredient to be added to refined carbohydrates to make them healthier by reducing the carbohydrate digestion rate of foods as well as increase the dietary fibre content, and therefore reduce the blood glucose spikes caused by these foods. The food's taste, colour and texture remains similar, so consumers do not have to make any compromise or sacrifice. They can continue to eat their favourite food from their favourite brands.

The Future of Food



At Alchemy, we believe that the future of food will no longer be just something people eat for energy or pleasure but more importantly, food will be for more diabetic friendly and healthy ageing. Our fight against diabetes has just began, and your food can be the next new food with Alchemy's technology. Join us to make food better, naturally.



Talk to Us

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