1 HOLISTIC HEALTH MANAGEMENT: NUTRITION, EXERCISE AND GLYCEMIC INDEX

.

# 8 ABSTRACT

Lu (2022) proposed a holistic health model that includes the impact of exercise and Western medicine on physical health. This article aims to explore the important role of glycemic index (GI) in holistic health management, especially its impact on physical health in conjunction with diet, exercise and blood sugar regulation in nutrition. Through in-depth analysis and discussion of the GI value of food, the changes in GI value before and after meals, and the impact of ultra-slow jogging after meals on GI value, and finally providing relevant empirical case analysis of people in healthy and diseased states, the purpose is to assist in blood sugar management and improve the overall health level of the person.

9

1. *Keywords: Holistic Health Management, Nutrition, Exercise, Glycemic Index, Super Slow*
2. *Jogging*

***INTRODUCTION***

Discerning the health benefits of resistance compared with aerobic exercise is useful for providing training diversity and augmenting exercise adherence. Given T2D is an independent risk factor for low muscular strength and accelerated decline in muscle mass/functional status, resistance exercise could be a viable strategy to combat risk in falls and dissuade sarcopenic (age-associated decline in muscle mass) losses (Syeda et al., 2023). Lifestyle modification requires behavior change, therefore, counseling is necessary. This should employ evidence-based behavior change techniques, such as cognitive behavioral therapy and motivational interviewing.18 This is necessary in order to explore the health beliefs of the individual; and to identify and overcome any barriers to change, and with them, prioritize the risk factors they wish to address, while increasing their confidence and self-efficacy (Ofori & Unachukwu, ,2014).

12

# 1. HOLISTIC HEALTH MANAGEMENT

1. Since ancient times, most people have believed that health is the absence of disease. This
2. dichotomous concept of health has gradually been replaced by the concept of "whole person
3. wellness" since the end of the 20th century. The concept of holistic health includes: (1)
4. physical health refers to the normal functioning of the organs and systems of the human
5. body and sufficient functions to meet the needs of daily life; (2) mental health refers to the
6. ability to think clearly and thoroughly, express one's emotions, and deal with stress, sadness,
7. and anxiety; (3) social health refers to the ability to maintain harmonious relationships with
8. others and happily integrate into the social system (Clark, Drain, & Malone, 2003). According
9. to the definition of the World Health Organization, health is a state of physical, mental and
10. social integrity, not just the absence of disease. Less than 25% of people are truly healthy
11. (the first state) or sick (the third state), while 75% of people are in a subhealthy state (the
12. second state) (WHO, 2013). The holistic health model proposed by Lu (2022) distinguishes a
13. fourth state in addition to the three states: recovery. When a patient in the second state
14. enters the fourth state, if he is treated properly, he can enter the first state, otherwise if he is
15. not treated properly, he will return to the second state. Lu (2022) proposed a whole-person
16. health model that integrates three parts: (I) dimensions: body, mind, spirit, and social
17. dimensions, (II) states: health, subhealth, disease, and recovery, and (III) methods: Western
18. medicine, Eastern medicine and folklore therapies, religion and beliefs, sports, and martial
19. arts methods. This study will explore the impact of diet, exercise, and blood sugar regulation
20. on physical health in a holistic health model. 34
21. Physical health refers to the overall health and function of the body's systems, organs, and
22. tissues. It includes a person’s physical condition and their ability to carry out daily activities
23. without undue fatigue or physical limitations. A healthy person usually exhibits the following
24. characteristics, such as: (1) adequate strength, endurance, and flexibility, (2) appropriate
25. weight, (3) proper nutrition, (4) regular exercise, (5) adequate rest and sleep, and (6) the
26. absence of illness. Most people believe that the human body that has been free of disease
27. since ancient times is healthy. Since the late twentieth century, this dualism of health has
28. been slowly but steadily replaced by the concept of “whole-person health” (Hodapp, 1999). 43
29. Western medicine is an emerging modern medical scientific theoretical system based on
30. anatomy, biology and modern science and technology. Western medicine focuses on
31. medical professionals such as doctors and nurses using medical procedures such as drugs,
32. radiation and surgery to treat illness after making a diagnosis based on a person's individual
33. symptoms. Western medicine has preventive aspects such as diet and exercise, but
34. generally focuses on the use of medications and surgical treatments. Most modern
35. healthcare systems in the contemporary world are based on Western medicine. Western
36. medicine is practiced by doctors and allied health professionals who have formal degrees.
37. As evidence-based medicine developed rapidly in the 20th century, it included: (1)
38. questioning and examination of the body and its symptoms, (2) the use of clinically validated
39. scientific evidence to diagnose disease, and (3) health is a human right that needs to be
40. protected (Li, 1996).

56

# 2. RELATIONSHIP BETWEEN GLYCEMIC INDEX (GI) AND BLOOD GLUCOSE

1. Today, as nutrition and health management are increasingly valued, the glycemic index (GI),
2. as an important indicator to measure the impact of carbohydrates in food on blood sugar, is
3. gradually coming into the public eye. The glycemic index (GI) is an important indicator to
4. measure the speed and extent of blood sugar rise during the digestion and absorption of
5. food. It takes the GI value of glucose as 100 as a reference, and measures the area under
6. the blood glucose curve (AUC) of other foods after consuming 50 grams of available
7. carbohydrates, and compares it with the AUC produced by the same amount of glucose. The
8. percentage value obtained is the GI value of the food. The concept of GI value was first
9. proposed by Jenkins et al. in 1981, with the aim of helping diabetic patients and the general
10. population choose appropriate carbohydrate foods to better control blood sugar levels.
11. (Esfahani et.al., 2009).

69

1. According to the GI value, foods can be divided into high GI foods (GI ≥ 70), medium GI
2. foods (GI 55-69) and low GI foods (GI ≤ 55). Foods with different GI values have different
3. effects on blood sugar: (1) High GI foods: such as white rice, white bread, potatoes and
4. sugary drinks, are quickly digested and absorbed, causing blood sugar levels to rise rapidly.
5. (2) Medium GI foods: such as brown rice, oats, whole wheat bread, etc., whose effects on
6. blood sugar are between high GI and low GI foods. (3) Low GI foods: such as beans,
7. vegetables, most fruits and whole grains, are digested more slowly, causing blood sugar
8. levels to rise more gently and fluctuate less. Healthy eating is receiving increasing attention,
9. and the glycemic index (GI), as an important indicator to measure the impact of food on
10. blood sugar, is gradually becoming the focus of public attention. Foods with different GI
11. values have different effects on blood sugar. Understanding the characteristics of these
12. foods and their effects on blood sugar is important for maintaining health and preventing
13. disease. (1) High GI foods: such as white rice, white bread, pastries, sugary drinks, etc., are
14. often described as a "roller coaster" of blood sugar because of their fast digestion and
15. absorption speed. The carbohydrates in these foods have a simple structure and are easily
16. broken down by digestive enzymes, causing blood sugar to rise sharply in a short period of
17. time. However, this drastic change in blood sugar is not a good thing. It may cause
18. symptoms of hypoglycemia, such as dizziness and fatigue, and even stimulate the desire to
19. eat and lead to binge eating behavior. Studies have shown that the rapid absorption of
20. glucose after consuming high GI foods triggers a series of hormonal and metabolic changes
21. that lead to excessive food intake in obese people. Long-term intake of high GI foods may
22. also increase the risk of insulin resistance, thereby inducing type 2 diabetes and
23. cardiovascular disease (Ludwig et. al., 1999). (2) Medium GI foods: such as whole wheat
24. bread, oats, brown rice, etc., have a relatively moderate rate of blood sugar rise and can
25. provide the human body with a more lasting source of energy. The digestion and absorption
26. process of medium GI food is relatively stable, which can maintain a feeling of fullness for a
27. longer period of time. It is also rich in dietary fiber, vitamins and minerals. It is an ideal
28. choice for generally healthy people and diabetic patients. When eating medium GI foods,
29. pairing them with protein and dietary fiber, such as lean meat, vegetables or beans, can
30. further reduce the glycemic load and stabilize blood sugar. (3) Low GI foods such as whole
31. grains, beans, non-starchy vegetables and certain low-sugar fruits are considered the
32. "guardians" of blood sugar because they are slowly digested and absorbed, and their blood
33. sugar rise is small and stable. These foods are rich in dietary fiber, protein and healthy fats,
34. which not only help promote intestinal health, but also delay the rise of blood sugar and
35. reduce the risk of overeating. Long-term intake of low GI foods can help improve insulin
36. sensitivity, reduce the risk of diabetes and cardiovascular disease, and also have a positive
37. effect on weight management. Studies have shown that low GI foods eaten for breakfast
38. have a significant impact on food intake at lunch. Low GI foods may play an important role in
39. weight control and obesity management (Warren et. al., 2003). 109
40. The GI value has an important impact on blood sugar regulation. High GI foods cause blood
41. sugar to rise rapidly and stimulate the secretion of large amounts of insulin, but excessive
42. intake may lead to drastic fluctuations in blood sugar and increase the risk of insulin
43. resistance and type 2 diabetes. Low GI foods, on the other hand, are digested and absorbed
44. more slowly, causing blood sugar to rise slowly and insulin secretion to be more stable. This
45. helps reduce the risk of insulin resistance and maintain a feeling of fullness for a longer
46. period of time, playing a positive role in controlling weight and preventing metabolic diseases.
47. Insulin is a hormone secreted by the beta cells in the pancreas. Its main function is to
48. regulate metabolic activities in the body and has a key influence on the metabolism of
49. carbohydrates, fats and proteins. In terms of fat metabolism, insulin promotes fat synthesis
50. and storage. It can convert the ingested nutrients into fat and store it in adipose tissue, while
51. inhibiting the decomposition of fat and reducing the body's use of fat as an energy source.
52. Insulin also prompts the liver to convert glucose into glycogen for storage. As the insulin
53. concentration in the body increases, the glycogen content in the liver will also increase
54. accordingly. However, the liver's ability to store glycogen is limited. When the storage
55. reaches saturation, excess glucose will be converted into triglycerides (TG) under the
56. influence of insulin and further transported to fat cells for storage, leading to an increase in
57. body fat. Foods with a high glycemic index (GI) are quickly digested and absorbed after
58. entering the body, causing blood sugar to rise sharply, which in turn stimulates the pancreas
59. to secrete large amounts of insulin to lower blood sugar. Long-term consumption of high-GI
60. foods will lead to a decrease in the body's ability to respond to insulin, resulting in "insulin
61. resistance", that is, the cells' sensitivity to insulin decreases, and more insulin needs to be
62. secreted to achieve the same effect. When there is an excess of insulin and the liver
63. glycogen stores are full, the excess glucose will be converted into triglycerides, causing the
64. triglyceride concentration in the blood to rise. This not only increases the accumulation of
65. body fat, but also increases the risk of cardiovascular disease. 136
66. Insulin resistance and elevated triglycerides are both important risk factors for metabolic
67. syndrome. Metabolic syndrome is a clinical complex that is often accompanied by obesity,
68. hypertension, hyperglycemia and dyslipidemia, and significantly increases the incidence of
69. diabetes and cardiovascular diseases. Insulin resistance can affect blood sugar regulation
70. and may cause type 2 diabetes; while excessively high triglycerides are closely related to
71. cardiovascular problems such as atherosclerosis. Insulin plays a vital role in fat metabolism,
72. and changes in its concentration will affect the synthesis and storage of liver glycogen and
73. triglycerides. Excessive intake of high GI foods can cause abnormal changes in insulin and
74. triglyceride levels, further increasing the risk of metabolic syndrome and chronic diseases
75. (Jenkins, et. al., 2002). The GI value is not fixed. It is affected by many factors, including the
76. degree of food processing, ingredient composition, cooking method, food combination and
77. individual physiological condition. For example, the more processed the food is, the higher
78. the GI value is usually; foods with higher fiber content are digested more slowly and have
79. relatively lower GI values; different cooking methods can also affect the GI value of food;
80. when consumed with protein, fat or dietary fiber, the digestion rate of carbohydrates can be
81. slowed down, lowering the overall GI value; and an individual's digestive enzyme activity,
82. intestinal flora composition, insulin sensitivity, etc. may also affect the response to the GI
83. value. The study of GI value is widely used in the fields of nutrition and clinical medicine,
84. especially in diabetes, cardiovascular disease and weight management. For diabetic patients,
85. choosing low GI foods can help stabilize blood sugar levels and reduce fluctuations in high
86. and low blood sugar levels. Low GI foods can provide a longer feeling of fullness, reduce
87. total calorie intake, and help control weight and prevent obesity. Long-term intake of high GI
88. foods is associated with an increased risk of cardiovascular disease, and a low GI diet may
89. lower blood lipid levels and improve cardiovascular health. (Galgani, et. al., 2006) 161
90. The glycemic index (GI) is an important indicator to measure the impact of food on blood
91. sugar, and has important reference value in clinical nutrition and daily diet. Reasonable
92. selection of low GI foods can help stabilize blood sugar, reduce insulin fluctuations, and
93. contribute to diabetes management, weight control and cardiovascular health. However, the
94. GI value is only one indicator for evaluating the nutritional value of food. In actual diet
95. planning, the nutritional content of food, dietary structure and individual needs must be
96. comprehensively considered to achieve the best health effects. In terms of dietary choices,
97. we should give priority to low GI and medium GI foods, and reasonably combine protein and
98. dietary fiber. For example, you could choose oatmeal with nuts and fruit for breakfast or
99. brown rice with lean meat and vegetables for lunch. Such a diet combination can not only
100. provide sufficient energy but also maintain blood sugar stability, which is of great
101. significance for maintaining health and preventing diseases. High, medium and low GI foods
102. have different effects on blood sugar. Understanding the characteristics of these foods and
103. their effects on blood sugar is an important step in maintaining health and preventing
104. disease. When it comes to dietary choices, we should make wise choices, give priority to
105. low-GI and medium-GI foods, and rationally combine nutrients to achieve the best blood
106. sugar management results. Let us start from every meal and protect our health with a
107. scientific diet (Atkinson, et. al., 2008). Studies have shown that a low GI diet can not only
108. help diabetic patients effectively control blood sugar, but also has significant benefits for
109. maintaining blood sugar stability in healthy people, helping obese people lose weight and
110. improving insulin sensitivity. Numerous studies have shown that a low GI diet plays a vital
111. role in blood sugar management in diabetic patients. Systematic reviews and randomized
112. controlled trials (RCTs) have consistently shown that patients with diabetes have significant
113. improvements in fasting blood glucose (FBG) and glycated hemoglobin (HbA1c) after
114. following a low GI diet. This is mainly due to the fact that low GI foods can delay the
115. absorption of glucose, slow down the rise in blood sugar after meals, reduce blood sugar
116. fluctuations, and thus reduce the need for insulin secretion. Long-term adoption of a low GI
117. diet can also reduce the risk of type 2 diabetes. Studies have shown that a long-term high GI
118. diet can lead to increased insulin resistance (IR), while low GI foods can reduce excessive
119. insulin secretion, help maintain blood sugar stability, and reduce the burden on the pancreas.
120. This is extremely beneficial for patients who have been diagnosed with diabetes as well as
121. those with predicaments. 194
122. Healthy people can also gain multiple benefits by choosing low GI foods in their daily diet.
123. First, a low GI diet helps maintain stable blood sugar levels and reduce the impact of blood
124. sugar fluctuations on metabolic health. Studies have shown that sustained and drastic
125. fluctuations in blood sugar are closely related to inflammatory response, atherosclerosis and
126. increased risk of cardiovascular disease, while low-GI foods can effectively reduce such
127. risks. Secondly, low GI foods can increase satiety and reduce the possibility of overeating.
128. This is essential for controlling your weight and maintaining a healthy body shape. A
129. controlled study on low GI and high GI diets found that subjects in the low GI diet group had
130. significantly reduced hunger under the condition of same calorie intake, thereby reducing
131. their total daily calorie intake. A low GI diet can also improve athletic performance and
132. recovery. Eating low-GI foods before exercise can help prolong the duration of endurance
133. exercise, and after exercise it can help stabilize blood sugar and promote muscle recovery.
134. Therefore, low GI diet has also attracted much attention in the field of sports nutrition.
135. Studies have shown that different glycemic indexes (GI) in pre-exercise foods have
136. significant differences in their effects on exercise metabolism and endurance running ability.
137. Consuming a low GI meal 15 minutes before prolonged exercise can maintain normal blood
138. sugar levels during exercise and enhance endurance running ability (Karamanolis, et. al.,
139. 2011).

213

1. A low GI diet has shown significant advantages in blood sugar management in diabetic
2. patients, healthy people and obese people. However, the application of a low GI diet still
3. needs to take into account individual differences, including factors such as age, activity level,
4. basal metabolic rate and genetic influences. Obese people are a high-risk group for type 2
5. diabetes, and controlling blood sugar fluctuations and weight management are crucial to
6. reducing their health risks. Studies have shown that a low GI diet is effective in controlling
7. blood sugar and managing weight in obese people. Low GI foods can prolong feelings of
8. fullness and reduce overall calorie intake. Compared with high GI foods, low GI foods are
9. digested and absorbed more slowly, making blood sugar changes more stable after meals
10. and reducing hunger caused by a rapid drop in blood sugar. This makes it easier for obese
11. people to maintain a balance in energy intake on a low GI diet, thereby effectively controlling
12. their weight. A low GI diet can also improve insulin sensitivity and reduce the risk of insulin
13. resistance. Long-term intake of high-GI foods is closely related to the development of insulin
14. resistance, while a low-GI diet can reduce the burden of insulin secretion, increase cellular
15. responsiveness to insulin, and thus help improve metabolic abnormalities. Previous studies
16. have shown significant but inconsistent risk ratios or risk relationships (RRs) for type 2
17. diabetes (T2D) with dietary glycemic index (GI) and glycemic load (GL). In otherwise healthy
18. adults, a diet high in glycemic index (GI) or glycemic load (GL) is strongly associated with
19. the incidence of type 2 diabetes. Meta-analytic evidence shows that glycemic index (GI) and
20. glycemic load (GL) are important food markers for predicting the development of type 2
21. diabetes worldwide in people of European and East Asian ancestry. (Livesey, et. al., 2019) 235

# 3. BLOOD GLUCOSE AND INSULIN RESISTANCE

1. In the field of prevention and treatment of diabetes and related metabolic diseases, the
2. relationship between blood sugar and insulin resistance has always been the focus of
3. scientists. This article will take you deep into the subtle connection between the two and how
4. post-meal exercise can be a powerful assistant in blood sugar management. In short, insulin
5. resistance means that the body's tissues become sluggish in responding to insulin, resulting
6. in glucose being unable to enter cells and be used smoothly, causing blood sugar to rise.
7. Behind this phenomenon are abnormalities in intracellular insulin signaling, dysfunction of
8. adipose tissue, and the promotion of chronic low-grade inflammatory response. Obesity,
9. especially the accumulation of visceral fat, is an accomplice of insulin resistance. The pro-
10. inflammatory factors it secretes will further affect the transmission of insulin signals, making
11. insulin resistance worse (Petersen, et. al., 2018). A vicious cycle is formed between insulin
12. resistance and increased blood sugar. When tissue cells become less sensitive to insulin,
13. blood sugar rises. In order to maintain blood sugar balance, pancreatic beta cells have to
14. secrete more insulin, but long-term excessive secretion can lead to beta cell failure,
15. insufficient insulin secretion, and more serious blood sugar abnormalities. A high blood
16. sugar environment will increase oxidative stress and inflammatory response, which will have
17. a negative impact on insulin signaling, and insulin resistance will therefore become more and
18. more serious. Insulin resistance is one of the core mechanisms of type 2 diabetes. Long-
19. term insulin resistance can lead to insufficient insulin secretion, continued increase in blood
20. sugar, and eventually develop into diabetes. In addition to diabetes, insulin resistance is also
21. closely related to metabolic syndrome (obesity, hypertension, hyperlipidemia, etc.). These
22. factors are intertwined, forming a vicious cycle that is difficult to break. (Weickert, et. al.,
23. 2018).

260

1. In this battle between blood sugar and insulin resistance, post-meal exercise has become a
2. force that cannot be ignored. Post-meal exercise can lower blood sugar levels through a
3. variety of mechanisms, including promoting skeletal muscle glucose uptake, improving
4. insulin sensitivity, and reducing the release of inflammatory factors from fat cells. Different
5. types of exercise and exercise timing have different effects on blood sugar regulation.
6. Aerobic exercise (such as brisk walking and jogging) is more effective in lowering
7. postprandial blood sugar, while resistance exercise (such as weight training) helps improve
8. insulin sensitivity. Regarding the choice of exercise time, exercising within 15 to 30 minutes
9. after a meal can effectively reduce the postprandial blood sugar peak and prevent excessive
10. blood sugar fluctuations. Research shows that a structured exercise program is effective in
11. reducing insulin resistance in type 2 diabetes (Sampath Kumar, et. al., 2018). A low GI diet
12. not only has a positive impact on blood sugar management in diabetic patients, but also
13. helps healthy people maintain blood sugar stability and plays an important role in weight
14. management and metabolic health in obese people. Reasonable selection of low GI foods
15. and balanced nutritional intake can help promote overall health and reduce the risk of
16. metabolic diseases (Brand-Miller, et. al., 2002). 277
17. Empirical studies have shown that a low GI diet is crucial for blood sugar management in
18. patients with diabetes. The results of systematic reviews and randomized controlled trials
19. showed that patients who followed the principles of a low GI diet had significant
20. improvements in fasting blood glucose (FBG) and glycosylated hemoglobin (HbA1c) levels.
21. Low GI foods can slow down the rise in blood sugar after meals, reduce blood sugar
22. fluctuations, reduce the burden on the pancreas, and may reduce the risk of type 2 diabetes
23. and improve the quality of life of patients. For healthy people, a low GI diet also has positive
24. effects. Studies have shown that low GI foods can maintain blood sugar stability and reduce
25. the negative effects of blood sugar fluctuations on the body. In addition, a low GI diet can
26. enhance satiety, reduce the risk of overeating, and help prevent obesity and its related
27. metabolic diseases. Obese people are at high risk of type 2 diabetes. Empirical studies have
28. shown that a low GI diet is effective in controlling body weight and blood sugar. Low GI
29. foods can prolong satiety and reduce total calorie intake, while improving insulin sensitivity
30. and reducing the risk of insulin resistance (IR). Therefore, a low GI diet is considered one of
31. the effective means of weight management and blood sugar control in obese people. Studies
32. have shown that energy-restricted diets based on low GI foods can produce more significant
33. weight loss than equivalent diets based on high GI foods (Brand-Miller, et. al., 2002) 295
34. Empirical research provides strong evidence for the blood sugar regulating effect of post-
35. meal exercise. One study in people with type 2 diabetes found that 30 minutes of moderate-
36. intensity aerobic exercise after a meal significantly reduced blood sugar levels. In addition,
37. for healthy and obese people, post-meal exercise can also help prevent excessive blood
38. sugar fluctuations and reduce the risk of diabetes and metabolic diseases (Burdon, et. al.,
39. 2017). Blood sugar management is the key to preventing and controlling diabetes and
40. related metabolic diseases. By adjusting your lifestyle, such as choosing a low GI diet and
41. exercising regularly, you can effectively improve insulin sensitivity and reduce blood sugar
42. fluctuations. Post-meal exercise, as a simple and feasible strategy for blood sugar regulation,
43. is gradually becoming a new tool for blood sugar management. We still need to study the
44. optimal strategies for blood sugar regulation through different exercise modes in order to
45. provide more precise individualized recommendations. In this battle between blood sugar
46. and insulin resistance, scientific blood sugar management will ensure victory (McCartney, et.
47. al., 2018).

310

1. The glycemic index (GI) is an important indicator to measure the impact of carbohydrates on
2. blood sugar, and is of great significance for the dietary management of diabetic patients,
3. obese people and healthy people. Since it is difficult for individuals to perform rigorous
4. laboratory tests at home, how can we use blood glucose meters (SMBG) and continuous
5. blood glucose monitoring (CGM) to indirectly assess the impact of food on blood sugar and
6. help everyone make more reasonable dietary choices. (1) Use a blood glucose meter
7. (SMBG) to measure blood glucose response: The blood glucose meter is a simple and
8. convenient monitoring tool that can help individuals understand their blood glucose response
9. to different foods. The operation steps are as follows: measure blood sugar once on an
10. empty stomach before breakfast and record the value as a baseline. Choose pure
11. carbohydrate foods (such as white bread, oatmeal or rice) with a fixed carbohydrate content
12. (such as 25 grams or 50 grams), and avoid consuming protein, fat and other ingredients that
13. affect blood sugar. Measure blood sugar once 30 minutes, 60 minutes, 90 minutes and 120
14. minutes after food intake and record the results. Compare the changes in blood sugar at
15. different time points to determine the GI value of the food. High blood sugar peaks and large
16. fluctuations usually mean a high GI value. Advantages of SMBG: simple and easy,
17. personalized testing, and low cost. Disadvantages: limited measurement frequency, blood
18. sampling required, and large individual differences. (2) Use continuous glucose monitoring
19. (CGM) to obtain comprehensive data. CGM is a more advanced monitoring technology that
20. continuously records blood sugar changes through a subcutaneous sensor. How CGM
21. works: The device includes sensors, transmitters and display devices, measures blood sugar
22. every 5 minutes, and provides 288 data points per day to fully reflect blood sugar
23. fluctuations. Advantages of CGM: continuous monitoring, early warning, and improved
24. patient comfort. Disadvantages: high cost, measurement error, may cause skin irritation. 335
25. One study enrolled 25 patients. A total of 36,628 continuous glucose monitoring (CGM)
26. readings and 408 glucose meter (SMBG) readings were obtained. The incidence of
27. hyperglycemia measured using CGM and blood glucose meter was 5.65% and 14.2%,
28. respectively, and the incidence of hypoglycemia was 4.35% and 1.5%, respectively. The
29. results showed that all hypoglycemic events occurred between 16:00-19:00 in both methods,
30. but only 38 (9%) SMBG readings were performed within this time range, indicating some
31. differences in the results obtained by the two methods (Afandi, et. al., 2019). By measuring
32. blood sugar changes, you can optimize your dietary choices: (1) Choose low GI foods: such
33. as whole grains (oats, brown rice), beans (lentils, chickpeas), and fruits (apples, berries). (2)
34. Combine protein and healthy fats: Taking protein (fish, tofu, eggs) and healthy fats (nuts,
35. olive oil) together with carbohydrates can slow down the rise in blood sugar. (3) Regularly
36. monitor blood sugar: Use SMBG or CGM to record the relationship between diet and blood
37. sugar and adjust eating patterns. (4) Pay attention to exercise and lifestyle habits: Moderate
38. exercise (such as taking a walk after a meal) can stabilize blood sugar and improve insulin
39. sensitivity. Through SMBG and CGM, personal blood sugar response can be effectively
40. monitored, the GI value of food can be indirectly evaluated, and a reference can be provided
41. for personalized diet management. SMBG is suitable for general diabetic patients, while
42. CGM is suitable for people who need to closely monitor blood sugar fluctuations.
43. Reasonable selection of low-GI foods, combined with exercise and healthy habits, can
44. control blood sugar fluctuations and reduce the risk of diabetes and metabolic diseases.
45. Using a CGM increases the likelihood of avoiding exercise-induced hypoglycemia (Moser, et.
46. al., 2016). Insulin resistance (IR) is a pathological state in which the body's tissues become
47. less responsive to insulin, resulting in reduced glucose utilization efficiency and increased
48. blood sugar. This phenomenon is one of the core causes of type 2 diabetes mellitus (T2DM)
49. and metabolic syndrome. The action of insulin depends on the intracellular signal
50. transduction system. When the insulin receptor or downstream signal molecules (such as
51. IRS) are damaged, the glucose transporter (GLUT4) cannot move to the cell membrane
52. normally, resulting in obstruction of blood glucose uptake. This process is like a traffic jam,
53. making it difficult for insulin "instructions" to reach their "destination." Adipose tissue not only
54. stores energy, but also secretes cytokines such as leptin and adiponectin. Adiponectin
55. improves insulin sensitivity, whereas tumor necrosis factor-α (TNF-α) exacerbates insulin
56. resistance. Excessive accumulation of visceral fat can also cause chronic inflammation,
57. further weakening the effect of insulin. High concentrations of free fatty acids (FFA) in obese
58. people will stimulate liver gluconeogenesis, inhibit insulin receptor signaling, and form a
59. vicious cycle of insulin resistance. Insulin resistance causes blood sugar to rise, forcing
60. pancreatic β cells to secrete more insulin (hyperinsulinemia), but long-term overwork can
61. cause β cell failure and eventually lead to T2DM. At the same time, high blood sugar levels
62. can exacerbate oxidative stress and inflammation, further worsening insulin resistance.
63. Studies have shown that a low GI diet can improve insulin sensitivity in obese children with
64. high baseline insulin (Visuthranukul, et. al., 2015). 376
65. Exercise can activate the AMPK pathway in skeletal muscle, promote GLUT4 transport, and
66. reduce dependence on insulin. Moderate-intensity aerobic exercise (such as brisk walking
67. and jogging) is most effective if performed within 30 minutes after a meal and can effectively
68. reduce blood sugar fluctuations. The glycemic index (GI) of food is affected by factors such
69. as individual intestinal flora and insulin secretion capacity, and there are individual
70. differences. In a mixed meal, protein and fat can delay the absorption of carbohydrates and
71. lower the overall GI value. Therefore, blood sugar management needs to be combined with
72. the glycemic load (GL) value rather than focusing solely on the GI value. The interaction
73. between insulin resistance and blood glucose fluctuations reveals the complexity of
74. metabolic diseases. Moderate exercise, a balanced diet (paying attention to GL value) and
75. personalized nutritional strategies can effectively improve insulin sensitivity and reduce the
76. risk of T2DM. Studies have found that lifestyle-induced weight loss can improve insulin
77. resistance in patients with prediabetes, but only consumption of a low-GI diet can reduce
78. postprandial hyperinsulinemia. In contrast, a high GI diet, although resulting in significant
79. weight loss, impairs the function of pancreatic β cells and intestinal K cells (Solomon, et. al.,
80. 2010).

393

# 4. SUPER SLOW JOGGING

1. "Super Slow Jogging" is an innovative exercise model originated from the Japanese sports
2. medicine community. Its core value lies in achieving the dual goals of exercise benefits and
3. health management through "extremely low intensity, long-term maintenance". In terms of
4. kinematic parameters, the speed of ultra-slow jogging is 4-6 kilometers per hour, which
5. means it takes 10-15 minutes per kilometer, and the step frequency is 170-190 steps per
6. minute, which requires small strides. In terms of posture, you are required to keep your core
7. upright, land on the middle and front part of your foot, and land softly like a "cat walk". In
8. terms of breathing, you can have a complete conversation during exercise, and the score on
9. the Borg scale should not exceed 11, which is a pure aerobic exercise. The recommended
10. exercise time is 10-30 minutes at a time, which can be accumulated in segments, such as 10
11. minutes each in the morning, noon and evening. In terms of load, the heart rate should be
12. maintained at 50%-60% of the maximum heart rate (220-age). From the perspective of
13. biomechanical characteristics, the vertical impact force of ultra-slow jogging is reduced by
14. 40% compared to traditional jogging, and the force on the knee joint is reduced by 30%. In
15. muscle activation mode, the quadricepses are engaged 65%, the triceps surae 25%, and the
16. gluteus maximus 10%. In terms of energy consumption, about 4-5 calories are consumed
17. per minute, which is equivalent to the intensity of brisk walking (Chen, 2023). 412
18. Ultra-slow running can improve insulin sensitivity. Within 24 hours after exercise, the
19. expression of skeletal muscle GLUT4 transporter protein increased by 2.5 times,
20. mitochondrial biogenesis increased, cellular energy metabolism efficiency improved, and the
21. level of adiponectin secreted by adipose tissue increased, thereby enhancing the effect of
22. insulin. In terms of post-meal blood sugar control strategy, starting ultra-slow jogging 30
23. minutes after a meal can reduce blood sugar peak by 20%-30%. If you exercise continuously
24. for more than 20 minutes, the efficiency of muscle glucose absorption can be increased by 3
25. times. Within 48 hours after exercise, liver glucose output was reduced by 15% and blood
26. glucose variability was reduced. In the long run, after 6 months of ultra-slow running training,
27. fasting blood sugar can be reduced by 0.8-1.5mmol/L, glycosylated hemoglobin (HbA1c) can
28. be reduced by 0.4%-0.6%, visceral fat area can be reduced by 5-8cm², and the risk of
29. metabolic syndrome can be reduced by 35%. In terms of choosing the right time to exercise,
30. ultra-slow jogging 30 minutes after breakfast can start the daytime metabolic rhythm; doing it
31. one hour after lunch can avoid gastrointestinal discomfort; and doing it two hours after dinner
32. can help promote fat oxidation at night. We recommend a three-phase step-by-step training
33. program. Beginner stage (1-2 weeks): exercise for 10 minutes each time, and maintain the
34. heart rate at 50% of the maximum heart rate; advanced stage (3-4 weeks): 20 minutes each
35. time, add 1 minute of brisk walking + 2 minutes of jogging intervals; maintenance stage
36. (after 5 weeks): 30 minutes each time, you can try changes in slope, such as a 5% slope. In
37. terms of exercise intensity monitoring, the discourse test method can be used, that is, being
38. able to speak a 20-word sentence completely; the rating of perceived exertion (RPE) scale is
39. maintained at level 3-4 (easy to slightly strenuous); when monitoring heart rate, the
40. maximum heart rate during exercise does not exceed 60% (Byun, et. al., 2024). 436
41. In terms of blood sugar management, if blood sugar is lower than 5.6mmol/L before exercise,
42. 15g of carbohydrates should be supplemented; measure blood sugar every 30 minutes
43. during exercise, and stop exercising immediately if it is lower than 4.4mmol/L; measure
44. blood sugar again 30 minutes after exercise, and if it is lower than 5.0mmol/L, sugar
45. supplementation is required. In terms of disease risk prevention and control, patients with
46. diabetic retinopathy should avoid violent head shaking; patients with peripheral neuropathy
47. need to check foot sensation and wear customized insoles; those who use insulin need to
48. adjust the pre-meal dose and reduce it by 10%-20%. In terms of equipment and environment,
49. you should choose sports shoes with shock-absorbing function, such as the ASICS GEL
50. series; plastic tracks or grass tracks should be preferred as sports venues, and hard roads
51. should be avoided; summer sports require electrolyte drinks with a sodium content of 500
52. mg/L. You can use a sports bracelet to monitor the average heart rate variability (HRV) after
53. 7 consecutive days of exercise; use a blood glucose meter to record the comparison of
54. blood glucose curves of "exercise day vs. non-exercise day"; perform body composition
55. analysis every month to measure changes in visceral fat area and muscle mass. As an
56. important tool for diabetes management, the core value of ultra-slow jogging lies in “low risk
57. and high compliance”. It is recommended that beginners start with 10 minutes a day and
58. gradually build exercise habits. For those with concurrent chronic diseases, it is imperative to
59. develop a personalized plan under the guidance of a physician. Start with the first step now
60. and make scientific exercise the cornerstone of stable blood sugar! 457

# 5. ULTRA SLOW RUNNING CASE 1: HUANG YUSHUN, A TYPE 1 DIABETES

1. **PATIENT**
2. (1) Case Introduction
3. Huang Yushun was born in Taiwan in 1973 that was diagnosed with type 1 diabetes at the
4. age of 28. At that time, he was receiving treatment at Changhua Christian Hospital. Initial
5. treatment consisted mainly of oral medication, but after about two weeks of ineffectiveness,
6. it was switched to insulin injections. The doctor prescribed mixed insulin, which was injected
7. once in the morning and once in the evening. This treatment method lasted for quite a long
8. time. Diagnosed at the age of 28, married at the age of 31, had a son at the age of 33. Now
9. his son is 16 years old, in good health and loves sports. In 2011, my doctor adjusted my
10. insulin treatment plan to four injections a day: rapid-acting insulin before each of the three
11. meals and basal insulin before bed, an average of at least four injections a day (adjusted
12. based on dietary intake). This scheme is still used today. He has made special videos and
13. shared them on his personal Youtube channel. As a patient with type 1 diabetes, he shares
14. what he has learned from doctors, what he has researched on his own, and his real-life
15. experiences. Diabetes has become a core issue in his daily life, and work, diet and exercise
16. are closely related to it. (Huang, 2024a) 475
17. (2) The first experiment: eating only white rice and not exercising
18. The purpose of this experiment is to observe the postprandial blood sugar fluctuations in
19. diabetic patients after they ingest two servings of white rice (about 80 grams) equivalent to
20. carbohydrates (sugars), and to compare and analyze the blood sugar changes with those
21. under normal eating patterns. The first step was to weigh the sample. He used an electronic
22. scale to weigh the white rice sample: single serving of carbohydrate equivalent (40 grams) ×
23. 2 = 80 grams. The blood glucose monitoring device uses a continuous blood glucose
24. monitoring system (brand: Abbott Libre) for real-time blood glucose tracking. Before the
25. experiment, confirm that the device is worn normally and calibrate the baseline data. 485
26. At 7:00 a.m. on the same day, 12 units of long-acting insulin were injected. Rapid-acting
27. insulin: No injection (to eliminate interference factors). No breakfast was eaten before the
28. experiment (fasting state ≥ 8 hours). Exercise status: No strenuous exercise in the 48 hours
29. before the experiment. Rapid-acting insulin should be precisely matched to carbohydrate
30. intake, and basal insulin should be maintained at a steady dose to control fasting blood
31. sugar. The fasting blood sugar measurement time is as follows: 13:00PM (before meal
32. baseline value), blood sugar value: 88 mg/dL (obtained by scanning the sensor through the
33. APP), 13:10PM started eating 80 grams of white rice, chewing it in several times to avoid
34. swallowing too quickly. Post-meal blood sugar monitoring is as follows:(1) 13:27 (17 minutes
35. after meal): 94 mg/dL,(2) 14:12 (62 minutes after meal): 173 mg/dL,(3) 15:12 (122 minutes
36. after meal): 187 mg/dL (peak),(4) 17:10 (240 minutes after meal): 132 mg/dL,(5) 18:10 (300
37. minutes after meal): 105 mg/dL. The characteristics of blood sugar fluctuations are that there
38. is no significant change in blood sugar within 10 minutes after a meal (delayed period of food
39. digestion), a sharp rise in blood sugar 60-120 minutes after a meal (peak delayed to 2 hours),
40. and blood sugar returns to the fasting level 5 hours after a meal (prolonged metabolic cycle).
41. The normal blood sugar peak after a meal usually occurs in about 1 hour, while the peak in
42. diabetic patients is delayed and higher (187 mg/dL vs normal <140 mg/dL). Nutritionists
43. recommend that the experiment should be controlled within two servings of carbohydrates to
44. ensure safety. It is recommended that diabetic patients limit their carbohydrate intake to 2-3
45. servings (about 80-120 grams) per meal. Excessive intake may cause severe hyperglycemia
46. (>300 mg/dL). This experiment confirmed that there is a significant delay and peak increase
47. in blood sugar response to carbohydrates in diabetic patients. By precisely controlling
48. carbohydrate intake, the fluctuation range of postprandial blood sugar can be effectively
49. reduced, providing a scientific basis for personalized dietary management (Huang, 2024b). 510

# 6. ULTRA-SLOW RUNNING CASE 2: PEDIATRICIAN WU QIYING

1. (1) Case Introduction
2. Dr. Wu Qiying (MD) was born in 1991 and graduated from the Department of Medicine of
3. National Taiwan University. He has served as a resident and chief physician in the
4. Department of Pediatrics of the National Taiwan University Medical Hospital. He is in good
5. health and is currently a physician at the Canglan Health Aesthetics Clinic. He also opened a
6. Youtube channel called "Blue Pigeon's Medical World", which has received more than 50
7. million online views and over 500,000 subscribers (Wu, 2024a).

519

1. (2) Experimental process
2. The topic of this test is: The impact of ultra-slow running after meals on blood sugar. To
3. verify this, I started a very gentle jog 10 minutes after eating to ensure that it would not affect
4. my gastrointestinal digestion. The goal of this test, which involved running for 20 minutes,
5. was to see if blood sugar peaks could be reduced as a result. Ultra-slow jogging is a
6. medium-to-low intensity exercise. I suggest starting it 20 minutes after a meal to achieve
7. better results. In this test, my blood sugar before the meal was 103 mg/dL, and when I
8. started jogging 10 minutes after the meal, it was 97 mg/dL. Since the food has not been fully
9. digested at this time, blood sugar does not change much. However, as the run progressed,
10. blood sugar gradually dropped, reaching 86 mg/dL by the end of the exercise (12:00).
11. What’s even more surprising is that since a large amount of glucose and glycogen was
12. consumed during running, after the subsequent digestion and absorption of food, my blood
13. sugar level was only up to 97 mg/dL, and it didn’t even break 100, which was even lower
14. than the value before meals! This proves that ultra-slow running after a meal has a very
15. significant effect on stabilizing blood sugar. At present, ultra-slow jogging is considered to be
16. one of the sports with the highest CP value. It is recommended to start 20 minutes after a
17. meal, at about 150BPM (150 heart rate per minute), and increase to 180BPM after 10
18. minutes, slightly speeding up to further improve blood sugar control (Wu, 2024b). 538

# 7. CONCLUSIONS

1. Through in-depth analysis and discussion of the GI value of food, the changes in GI value
2. before and after meals, and the impact of ultra-slow jogging after meals on GI value, and
3. finally providing relevant case analysis of people in healthy and diseased conditions, ultra-
4. slow jogging has a significant effect on stabilizing blood sugar after meals and is worthy of
5. promotion. If you want to effectively control blood sugar through a combination of diet and
6. exercise, you can refer to this "low GI diet + ultra-slow jogging exercise" plan designed
7. specifically for blood sugar management. It will help you gradually establish a healthy
8. lifestyle, improve insulin sensitivity, and make blood sugar management easier and more
9. controllable. In terms of diet, we have designed a three-stage diet management method. For
10. breakfast, you can choose whole wheat bread or oatmeal with eggs and low-fat milk, and
11. add apples or oranges. Whole wheat bread and oatmeal are rich in dietary fiber, which can
12. help stabilize blood sugar; eggs and low-fat milk provide high-quality protein and provide
13. energy for the body; while apples or oranges can supplement rich vitamins. For lunch, it is
14. recommended to choose brown rice or whole wheat pasta as the staple food, paired with
15. green leafy vegetables such as spinach and broccoli, as well as chicken breast or beans.
16. Green leafy vegetables should make up half of your plate, which can increase your dietary
17. fiber intake and help control the rate at which blood sugar rises. For dinner, you can choose
18. low-glycemic staples such as sweet potatoes and pumpkins, paired with stir-fried vegetables
19. or cold dishes, and add fish or tofu. Sweet potatoes and pumpkins not only have a rich taste,
20. but also provide stable energy; stir-fried vegetables and cold dishes are rich in dietary fiber,
21. which helps maintain blood sugar stability; fish and tofu are rich in unsaturated fatty acids
22. and high-quality protein, which are very beneficial to health. 562
23. When it comes to exercise, ultra-slow jogging is a simple and effective option. In terms of
24. timing, start ultra-slow running 30 minutes after breakfast, and start ultra-slow running 1 hour
25. after lunch and dinner. In terms of exercise intensity, you should follow the principle of
26. "chatting while running" and maintain a slow pace of 60-70 steps per minute. This will
27. achieve the effect of exercise without over-consuming physical energy. For beginners, you
28. can start with 10 minutes of easy ultra-slow running after each meal, and then gradually
29. increase to 30 minutes of ultra-slow running after each meal. In the process of implementing
30. the plan, there are several key points to note. First of all, you must maintain your water
31. intake and replenish water in time throughout the exercise to prevent dehydration. Secondly,
32. check your blood sugar level before and after ultra-slow running to ensure that it is within a
33. safe range. In addition, you should do 5-10 minutes of brisk walking or stretching before
34. ultra-slow jogging to activate your muscles and avoid sports injuries. Professional stretching
35. should also be performed after exercise to relieve muscle tension and promote body
36. recovery. The core value of this plan is to establish blood sugar homeostasis through
37. optimizing dietary structure and scientific exercise stimulation. Whole-grain foods, green
38. leafy vegetables and low-GI staples provide a solid foundation for stable blood sugar, while
39. ultra-slow jogging improves insulin efficiency through moderate aerobic exercise. As long as
40. you stick to this plan, you will see your blood sugar curve gradually become more stable and
41. your metabolic sensitivity will be significantly improved. Follow this plan and make blood
42. sugar management a controllable lifestyle! 583

# REFERENCES

1. Afandi, B., Hassanein, M., Roubi, S., & Nagelkerke, N. (2019). The value of continuous
2. glucose monitoring and self-monitoring of blood glucose in patients with gestational
3. diabetes mellitus during Ramadan fasting. Diabetes Research and Clinical Practice, 151,
4. 260–264.
5. Atkinson, F. S., Foster-Powell, K., & Brand-Miller, J. C. (2008). International tables of
6. glycemic index and glycemic load values: 2008. Diabetes Care, 31(12), 2281–2283.
7. Brand-Miller, J. C., Holt, S. H., Pawlak, D. B., & McMillan, J. (2002). Glycemic index and
8. obesity. The American Journal of Clinical Nutrition, 76(1), 281S–285S.
9. Burdon, C. A., Spronk, I., Cheng, H. L., & O’Connor, H. T. (2017). Effect of glycemic index of
10. a pre-exercise meal on endurance exercise performance: A systematic review and meta-
11. analysis. Sports Medicine, 47(6), 1087–1101.
12. Byun, K., Hyodo, K., Suwabe, K., Fukuie, T., Ha, M. S., Damrongthai, C., Kuwamizu, R.,
13. Koizumi, H., Yassa, M. A., & Soya, H. (2024). Mild exercise improves executive function
14. with increasing neural efficiency in the prefrontal cortex of older adults. Geroscience,
15. 46(1), 309–325.
16. Chen, S.M. (2023). Exercise intervention during weight loss in patients with diabetes and
17. obesity. Journal of Diabetes Education Association of the Republic of China, 19(4), 33–
18. 35.
19. Clark, P. A., Drain, M., & Malone, M. P. (2003). Addressing patients’ emotional and spiritual
20. needs. Joint Commission Journal on Quality and Safety, 29, 659–670.
21. Esfahani, A., Wong, J. M., Mirrahimi, A., Srichaikul, K., Jenkins, D. J., & Kendall, C. W.
22. (2009). The glycemic index: Physiological significance. Journal of the American College
23. of Nutrition, 28(Suppl), 439S–445S.
24. Galgani, J., Aguirre, C., & Díaz, E. (2006). Acute effect of meal glycemic index and glycemic
25. load on blood glucose and insulin responses in humans. Nutrition Journal, 5, 22.
26. Hodapp, R. M. (1999). Indirect effects of genetic mental retardation disorders: Theoretical
27. and methodological issues. International Review of Research in Mental Retardation, 22,
28. 27–50.
29. Huang, Y.S. (2024a). Shunzi’s diabetic life / Shunzi’s diabetic life. Retrieved from
30. https://shun-shop.fourthwall.com/products/slug-lgcfmhti
31. Huang, Y.S. (2024b). Blood sugar test: Brown rice has been tested to increase blood sugar.
32. Does eating brown rice increase blood sugar less? [video]. Youtube.
33. https://[www.youtube.com/watch?v=Mc1tWkw12ZE](http://www.youtube.com/watch?v=Mc1tWkw12ZE)
34. Jenkins, D. J., Kendall, C. W., Augustin, L. S., Franceschi, S., Hamidi, M., Marchie, A.,
35. Jenkins, A. L., & Axelsen, M. (2002). Glycemic index: Overview of implications in health
36. and disease. The American Journal of Clinical Nutrition, 76(1), 266S–273S.
37. Karamanolis, I. A., Laparidis, K. S., Volaklis, K. A., Douda, H. T., & Tokmakidis, S. P. (2011).
38. The effects of pre-exercise glycemic index food on running capacity. International Journal
39. of Sports Medicine, 32(9), 666–671.

669

624

625

626

627

628

629

630

631

632

633

634

635

636

637

638

639

640

641

642

643

644

645

646

647

648

649

650

651

652

653

654

655

656

657

658

659

660

661

662

663

664

665

666

667

668

Li, J. W. (1996). East-West medical exchange and integration of Chinese and Western medicine. Journal of Chinese Medicine, 7(4), 211–216.

Livesey, G., Taylor, R., Livesey, H. F., Buyken, A. E., Jenkins, D. J. A., Augustin, L. S. A., Sievenpiper, J. L., Barclay, A. W., Liu, S., Wolever, T. M. S., Willett, W. C., Brighenti, F., Salas-Salvadó, J., Björck, I., Rizkalla, S. W., Riccardi, G., La Vecchia, C., Ceriello, A., Trichopoulou, A., ... Brand-Miller, J. C. (2019). Dietary glycemic index and load and the risk of type 2 diabetes: A systematic review and updated meta-analyses of prospective cohort studies. Nutrients, 11(6), 1280.

Lu, L. (2022). A comprehensive healthcare model: Dimension, status, and approach.

International Journal of Multidisciplinary Research and Analysis, 5(10), 2597–2602.

Ludwig, D. S., Majzoub, J. A., Al-Zahrani, A., Dallal, G. E., Blanco, I., & Roberts, S. B. (1999).

High glycemic index foods, overeating, and obesity. Pediatrics, 103(3), E26.

McCartney, D., Desbrow, B., & Irwin, C. (2018). Post-exercise ingestion of carbohydrate, protein and water: A systematic review and meta-analysis for effects on subsequent athletic performance. Sports Medicine, 48(2), 379–408.

Moser, O., Mader, J. K., Tschakert, G., Mueller, A., Groeschl, W., Pieber, T. R., Koehler, G., Messerschmidt, J., & Hofmann, P. (2016). Accuracy of continuous glucose monitoring (CGM) during continuous and high-intensity interval exercise in patients with type 1 diabetes mellitus. Nutrients, 8(8), 489.

Petersen, M. C., & Shulman, G. I. (2018). Mechanisms of insulin action and insulin resistance. Physiological Reviews, 98(4), 2133–2223.

Sampath Kumar, A., Maiya, A. G., Shastry, B. A., Vaishali, K., Ravishankar, N., Hazari, A., Gundmi, S., & Jadhav, R. (2019). Exercise and insulin resistance in type 2 diabetes mellitus: A systematic review and meta-analysis. Annals of Physical and Rehabilitation Medicine, 62(2), 98–103.

Solomon, T. P., Haus, J. M., Kelly, K. R., Cook, M. D., Filion, J., Rocco, M., Kashyap, S. R., Watanabe, R. M., Barkoukis, H., & Kirwan, J. P. (2010). A low-glycemic index diet combined with exercise reduces insulin resistance, postprandial hyperinsulinemia, and glucose-dependent insulinotropic polypeptide responses in obese, prediabetic humans. The American Journal of Clinical Nutrition, 92(6), 1359–1368.

Visuthranukul, C., Sirimongkol, P., Prachansuwan, A., Pruksananonda, C., & Chomtho, S. (2015). Low-glycemic index diet may improve insulin sensitivity in obese children. Pediatric Research, 78(5), 567–573.

Warren, J. M., Henry, C. J., & Simonite, V. (2003). Low glycemic index breakfasts and reduced food intake in preadolescent children. Pediatrics, 112(5), e414.

Weickert, M. O., & Pfeiffer, A. F. H. (2018). Impact of dietary fiber consumption on insulin resistance and the prevention of type 2 diabetes. The Journal of Nutrition, 148(1), 7–12.

World Health Organization. (2013). Health in all policies: Helsinki statement. Framework for country action. https://[www.who.int/publications/i/item/9789241506908](http://www.who.int/publications/i/item/9789241506908)

Wu, Q.Y. (2024a). Doctor Cang Lan Ge tells you: 90% of medical knowledge that is related to life is not taught by anyone! Taipei: Yuanshui Publishing House.

Wu, Q.Y. (2024b). Can ultra-slow running after a meal really reduce blood sugar peaks? [video]. Youtube. https://[www.youtube.com/watch?v=mmpP-4gMsE0&t=9s](http://www.youtube.com/watch?v=mmpP-4gMsE0&t=9s)

Yang, D. I. (2012). Returning to the energy of the heart: Comprehensive medicine for body and mind—Authentic medicine. Zan World, 97, 107–109.

Syeda, U. A., Battillo, D., Visaria, A., & Malin, S. K. (2023). The importance of exercise for glycemic control in type 2 diabetes. American Journal of Medicine Open, 9, 100031.

Ofori, S. N., & Unachukwu, C. N. (2014). Holistic approach to prevention and management of type 2 diabetes mellitus in a family setting. Diabetes, metabolic syndrome and obesity: targets and therapy, 159-168.