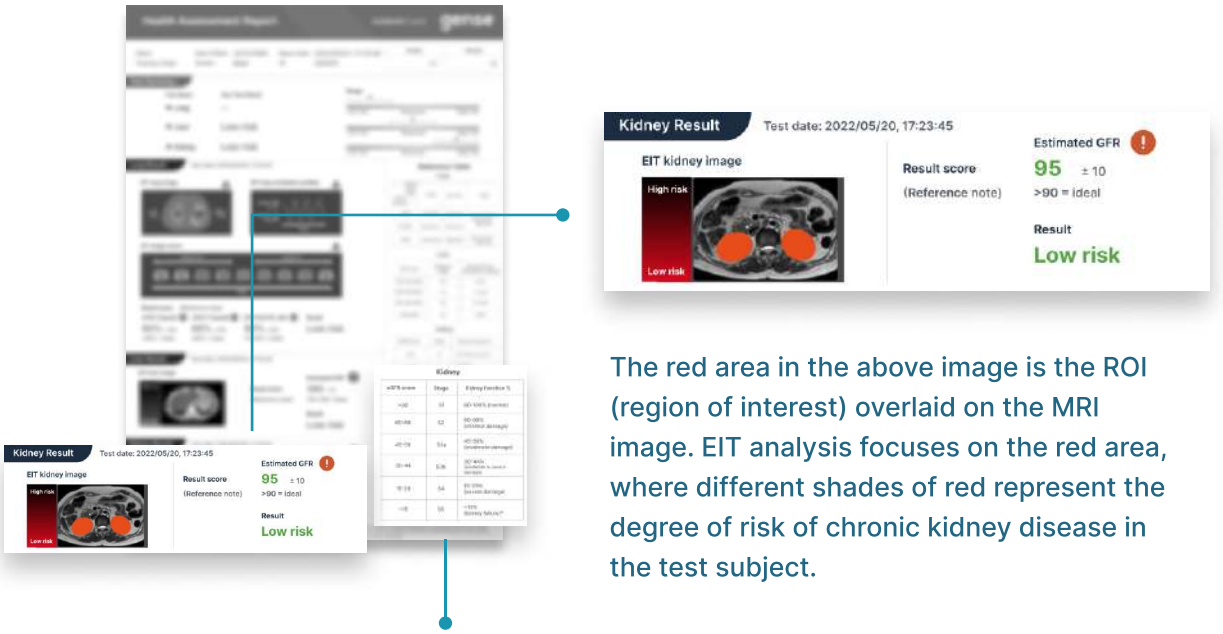
Your Test Result is Moderate

The test results show that your kidney function needs to be strengthened. Pay attention to your personal healthy habits, eat less fatty and sweet foods, and drink enough water to help you improve your kidney health. In addition, it is recommended that you use mediscan every 3 weeks to check your health condition in order to avoid deterioration. mediscan can also help you monitor your health condition after improving your habits and help you adjust your health care plan.

01 Understanding Personal Health Reports

Sample



The red area in the above image is the ROI (region of interest) overlaid on the MRI image. EIT analysis focuses on the red area, where different shades of red represent the degree of risk of chronic kidney disease in the test subject.

Risk level	eGFR scores	Stage	Kidney function
Low risk	≥90	S1	90-100% (normal)
Moderate	60-89	S2	60-89% (minimal damage)
High risk	45-59	S3a	45-59% (moderate damage)
	30-44	S3b	30-44% (moderate to severe damage)
	15-29	S4	15-29% (sever damage)
	<15	S5	>15 (Kidney failure)

Explanation

- The glomerular filtration rate (GFR) refers to the kidney's ability to filter a certain substance from the blood plasma within a unit of time. A lower GFR value indicates poorer kidney function[1].

- The estimated glomerular filtration rate (eGFR) is a functional indicator used to measure the kidney's ability to filter waste from the blood, and it can also help detect the presence of kidney damage. Doctors typically request blood tests to assess a patient's kidney function, and the pathology lab will provide eGFR results[2].

- The predicted estimated glomerular filtration rate (eGFR) refers to the EIT technology's prediction of the amount of blood that the kidneys can filter per minute. The more efficiently the kidneys can filter the blood, the higher the predicted eGFR value, indicating a better kidney function[3]. This can help assess the stage of chronic kidney disease. If the predicted eGFR value is greater than 90, it indicates normal kidney function. The lower the predicted eGFR value, the poorer the kidney function. The estimated glomerular filtration rate can also aid in the diagnosis and evaluation of chronic kidney disease (CKD).

S1	S2	S3	S4	S5
Indicates that kidney function is normal	Indicates mild chronic kidney failure with proteinuria and hematuria	Indicates moderate chronic kidney failure	Indicates severe chronic kidney failure	Indicates end-stage kidney disease.

(4)

Reasons for Increased Risk of CKD[10]

CKD is caused by a variety of factors - the major risk factors include:

Hypertension: Over time, high blood pressure puts undue stress on the small blood vessels in the kidneys, causing them to malfunction. When blood vessels in the kidneys are damaged, the kidneys may not be able to properly remove waste and excess fluids from the body. Excess fluid build-up in the blood vessels can further increase blood pressure, creating a dangerous cycle of damage[13].
Diabetes: Excess glucose in the blood can also damage small blood vessels in the kidneys, preventing them from properly removing waste and excess fluids from the body. This can lead to a type of chronic kidney disease called "diabetic nephropathy" which is specifically caused by diabetes[14].
Aging: After age 40, renal filtration rate capacity begins to decline by about 1% per year[14].
Polycystic kidney disease (PKD): Polycystic kidney disease is an inherited disorder that causes numerous fluid-filled cysts to grow in the kidneys. It is a type of chronic kidney disease that can impair kidney function and potentially lead to kidney failure[15].

Symptoms of CKD

Early chronic kidney disease may not present any symptoms, but as the disease worsens, patients may experience the following:

Swelling: When the body is unable to remove excess fluid and salt, patients may experience swelling, a condition known as edema. Edema can occur in the legs, feet or ankles, and less commonly in the hands or face[16].

Proteinuria: The first sign of diabetic nephropathy is the presence of protein in the urine. When small blood vessels in the kidney are damaged, a protein called albumin is excreted into urine.
Normally, albumin is not secreted into the urine from blood when kidney function is normal[17].

Symptoms of advanced chronic kidney disease: Chest pain, increased or decreased urination, loss of appetite, fatigue, and headache. Chronic kidney disease can be assessed through blood and urine tests. The former examines the kidney's ability to filter blood, known as the glomerular filtration rate (GFR), while the latter examines the amount of albumin in urine[1].

Consequences of Failing to Detect CKD in Time

Failure to detect and treat CKD in a timely manner may cause serious damage to the body. Consequences of not assessing CKD at an early stage include:

Renal failure: Impaired kidney function may gradually lead to renal failure, which is irreversible[18].

Neurological problems: Neurological complications can occur at various levels of the nervous system in patients with chronic kidney disease, including central nervous system (CNS) diseases such as stroke, cognitive impairment, and brain disorder, as well as peripheral nervous system (PNS) diseases such as autonomic and peripheral nerve damage. These complications have a significant impact on the rates of disease and patient deaths [19].

Heart disease: Patients with chronic kidney disease typically experience more stress to the heart, forcing the organ to work harder in order to pump blood to the kidneys, which can lead to the development of heart disease[20].

Reduced life expectancy: The life expectancy of patients with chronic kidney disease is influenced by the age of onset and the degree of worsening of the disease. Overall, life expectancy of patients is shortened compared to healthy individuals[21].

Fluid retention: This can result in swelling of the limbs and an increased risk of hypertension [22].

Increased potassium level: Elevated blood potassium levels are associated with decreased kidney electrolyte excretion. This condition called 'hyperkalemia' can increase the risk of arrhythmia and sudden death[23].

Dialysis: Prior to disease progression into kidney transplantation, patients undergo dialysis, a process where blood is removed from the body and mechanically filtered. This process can occur a minimum of three times a week in order to control blood pressure and maintain fluids and mineral balance, a cumbersome and debilitating process severely affecting daily life [24].

Kidney transplantation: Excessive water retention in the body leads to swollen limbs and increased risk of [24].

04 Daily Prevention

Protective Diet for the Kidneys

Dietary recommendations for patients with kidney disease:
Choose and prepare low salt/low sodium foods to help control blood pressure

- Daily sodium intake should be less than 2,300 milligrams[25]. About 0.5 teaspoon. (one teaspoon is about 5cc/ml)

Consuming an adequate amount of protein and the right type of protein can help protect the kidneys

- Consuming more protein than you need may increase the burden of protein metabolism on the kidneys. Foods containing animal protein include chicken, fish, meat, eggs, and dairy products, while plant-based protein sources include beans, nuts, and whole grains.
- The current recommended dietary intake of protein is 0.8 grams per kilogram of body weight[25]. According to the National Kidney Foundation in the United States, for patients with chronic kidney disease (stages 3-5) who are not on dialysis, metabolically stable*, and without diabetes, dietary protein intake can be reduced to 0.55-0.60 grams per kilogram of body weight per day[26].

Choosing heart-healthy foods can help prevent the accumulation of fat in blood vessels, heart, and kidneys

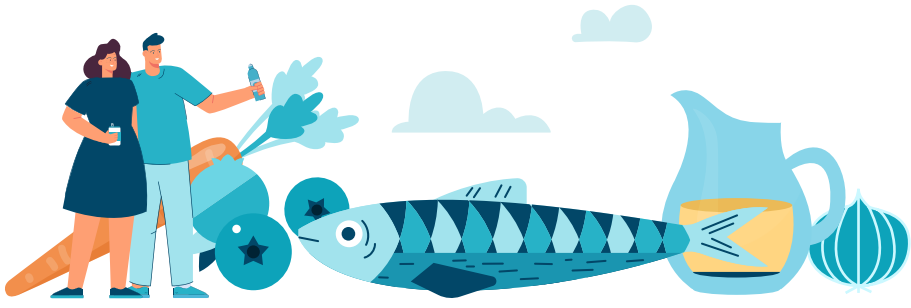
- Heart-healthy foods include lean meats, skinless poultry, fish, beans, vegetables, fruits, low-fat or fat-free milk, yogurt, and cheese.

Dietary recommendations for patients with declining kidney function[27]:
Choose foods and drinks that are low in phosphorus to help protect your bones and blood vessels

- Phosphorus can accumulate in the blood of patients with chronic kidney disease. Excess phosphorus in the blood can pull calcium from the bones, making them thinner, weaker, and more prone to fractures. High levels of phosphorus in the blood can also cause itching of the skin, as well as bone and joint pain.
- **Low-phosphorus food** options include fresh fruits and vegetables, bread, pasta, rice, rice milk (unenriched), corn and rice cereals, light-colored sodas such as lemon-lime or iced tea.
- **High-phosphorus foods** include poultry, fish, bran cereals and oatmeal, dairy products, beans, lentils, nuts, and dark-colored sodas, fruit juices, and drinks such as some bottled or canned iced teas that are enriched with phosphorus.

Choosing foods with an appropriate amount of potassium can help with normal nerve and muscle function

- Kidney damage can cause potassium to accumulate in the blood, leading to serious heart problems. Choosing low-potassium foods such as apples, peaches, carrots, mung beans, white bread, and pasta can help reduce potassium levels in the blood.



*Metabolically stable: Without any ongoing inflammation or infectious disease, no hospitalization within the past two weeks, no uncontrolled diabetes or consumptive diseases such as cancer, no lack of antibiotics or immunosuppressive drugs, and no significant weight loss in the short term.

Healthy Habits for Kidney Protection

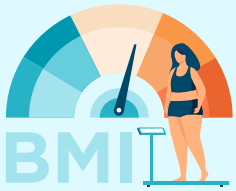
Regular exercise

You can alternate between aerobic and anaerobic exercises. Aerobic exercises include running, dancing, hiking, etc. Anaerobic exercises include weight lifting, squats, and other workouts that target large muscle growth but it is important to choose light weight equipment/exercise equipment to reduce strain on the kidneys. A light weight, multi-set exercise pattern can keep your body healthy, reduce blood pressure and the risk of chronic kidney failure[28]. Choose **3 days per week** and **exercise for at least 30 min per day -** a little shortness of breath is a good thing[28].

Maintain healthy weight

A healthy weight will prevent diabetes, heart disease and chronic kidney disease. BMI can be calculated using: Weight (kg) / (Height (m)*Height (m)). You should try to keep your BMI within the standard range of 18.5-22.9[29].

BMI	Weight status
Below 18.5	Underweight
18.5~22.9	Standard
23~24.9	Overweight
Above25	Obese



Reduce alcohol intake and control blood sugar

Alcohol alters kidney function by reducing its ability to filter blood and affecting the ability to regulate fluids and electrolytes in the body[30]. Alcohol also raises blood pressure, which is a common cause of kidney disease and heart disease. According to research, consuming alcohol significantly increases the risk of developing high blood pressure[31].

No smoking

Smoking slows the rate of blood flow to the kidneys, resulting in damage over time and increasing the risk of kidney cancer[32].

Regular check-ups

If you are at high risk for chronic kidney disease, such as diabetes and hypertension, kidney function should be checked regularly 1~2 months.