The Locomotive Challenge!

## Beating locomotive syndrome is one of the challenges facing Japan today.

The Japanese Orthopaedic Association believes that locomotive syndrome is a challenge that needs to be tackled by the whole of society, with healthcare providers, the private sector, and government all joining forces. So we've launched the Locomotive Challenge! Council to educate the public about locomotive syndrome and build a society resilient to it.

## The inspiration behind the Locomotive Challenge!

Japan has the oldest population in the world, and we consider e ducating the public about locomotive syndrome prevention to be one of the big challenges facing Japanese society today. So we've made our slogan the" Locomotive Challenge!".

## Want to know more about locomotive syndrome?

ロコモ ONLINE

Packed with info on preventing locomotive syndrome!
Visit the Locomotive Challenge website!

**https://locomo-joa.jp**


**Name of organization:** The Locomotive Challenge! Council
**Address:** Japanese Orthopaedic Association
2-40-8 Hongo, Bunkyo-ku, Tokyo 113-8418, Japan

**Founded:** August 2010
**Website:** https://locomo-joa.jp
**E-mail:** contact@locomo-joa.jp





FY2025 Locomotive Syndrome Pamphlet. Released June 1, 2025. Designed and produced by the Locomotive Challenge! Council, Japanese Orthopaedic Association.



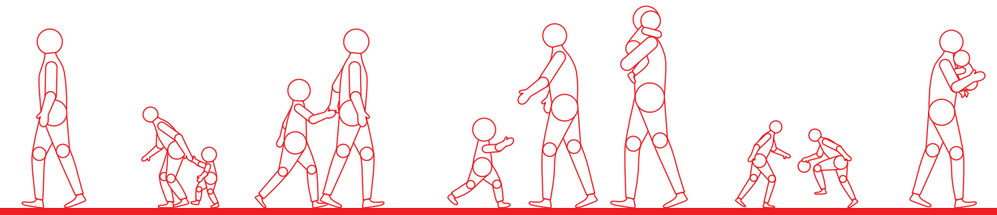
LOCOMO Challenge Search

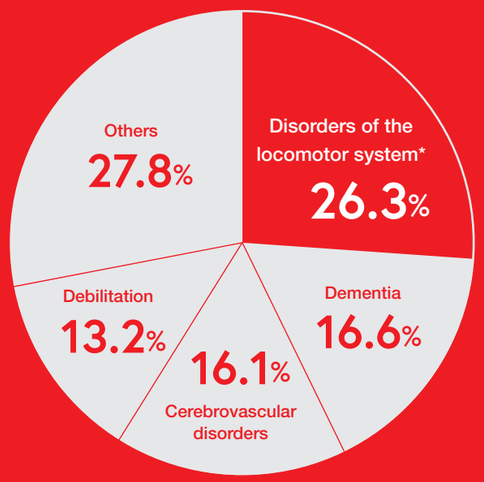


# Locomotive Syndrome

ロコモ

## Continue walking on your own for life.






The #1 reason for requiring special assistance or nursing care is

## disorders of the locomotor system!

What is the locomotor system?

What is locomotive syndrome?

*Disorders of the locomotor system include fractures, falls, joint disorders, and spinal cord injuries.
Modified from the Ministry of Health, Labour and Welfare's *Summary Report of Comprehensive Survey of Living Conditions 2022*.

## Official Website for Prevention and Awareness of Locomotive Syndrome

ロコモ ONLINE

**Japanese Orthopaedic Association**

# Learn: What is locomotive syndrome?

Humans evolved the ability to move around on two feet. Learn about locomotive syndrome and take proper precautions to continue walking your way through life.

## “Locomotive syndrome” is a condition of reduced mobility due to a disorders of the locomotor system.

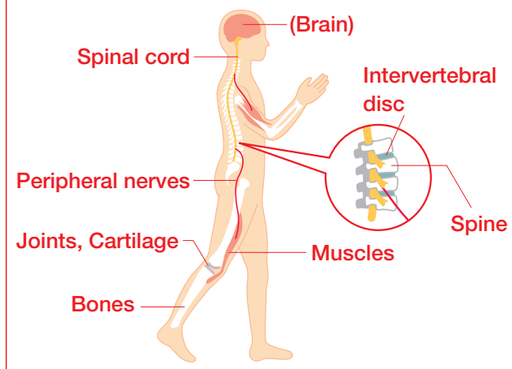
“Locomotion” is another word for movement, which can then be modified into “locomotive” to mean having the ability to move. Locomotive syndrome refers to a condition in which that ability is insufficient or in decline. It is also sometimes abbreviated to just “locomo.”

The comprehensive bodily system necessary for various “movements” such as standing, walking, and working is called the “locomotor system.” It consists of your bones, joints, muscles, and nerves. Locomotive syndrome is a condition in which your physical capabilities for actions like standing and walking (mobility) decline due to disorders in this system. As it progresses, the risk of requiring nursing care in the future increases.

### What is the locomotor system?

Your bones, muscles, joints, spinal cord, and nerves all work together as parts of the locomotor system that moves your body.

We normally move our bodies without thinking, but every movement we make is thanks to each part working in sync to make it happen. Your body can’t move properly if any one of them is out of order.




### How locomotive syndrome works

| | | | |
|---|---|---|---|
| Bones | ·Osteoporosis<br>·Fractures | Pain/numbness | Limited range of motion |
| Cartilage/discs | ·Osteoarthritis<br>·Spondylosis | Atrophy | Poor Posture |
| Muscles/nerves | ·Nerve damage<br>·Sarcopenia<br>· Spinal canal stenosis | Loss of muscle strength/numbness | Poor balance |

Decline in mobility (Gait disorder)

Restricted daily activities
Limited social participation
Need for nursing care

### Be careful, even if you don’t have subjective symptoms

Since modern society is equipped with an array of convenient means of transportation, many people go about their lives without any particular difficulties despite actually having locomotive syndrome or even experiencing advanced stages of it. Also, people with lifestyle diseases like high blood pressure are susceptible to illnesses that cause locomotive syndrome from a relatively young age.

The locomotive syndrome risk test allows you to easily assess if you have locomotive syndrome. Even if you’re already experiencing it, it’s important to make sure it doesn’t progress. It’s important to keep your locomotor system in good shape and extend your healthy life expectancy so you can continue walking for life.

*If you take appropriate measures, your mobility will improve again.

Do any apply to you?

## Seven warning signs of locomotive syndrome (Loco-Check)

**1**

You can’t put your sock on standing on one leg.

**2**

You often trip up or slip around the house.

**3**

You need to hold on to the handrail when climbing the stairs.

**4**

You have difficulty doing moderately heavy housework.

*Vacuuming or carrying mattresses and bedding, etc.

**5**

You have difficulty carrying home 2kg of shopping.

*Equivalent to two 1-liter milk cartons.

**6**

You can’t walk for a quarter of an hour nonstop.

**7**

You can’t make it across the road before the light turns red.

**All seven of these are signs that your locomotor system, including your bones, joints, and muscles, is in decline.**
**If even one of these applies, you may have locomotive syndrome.**

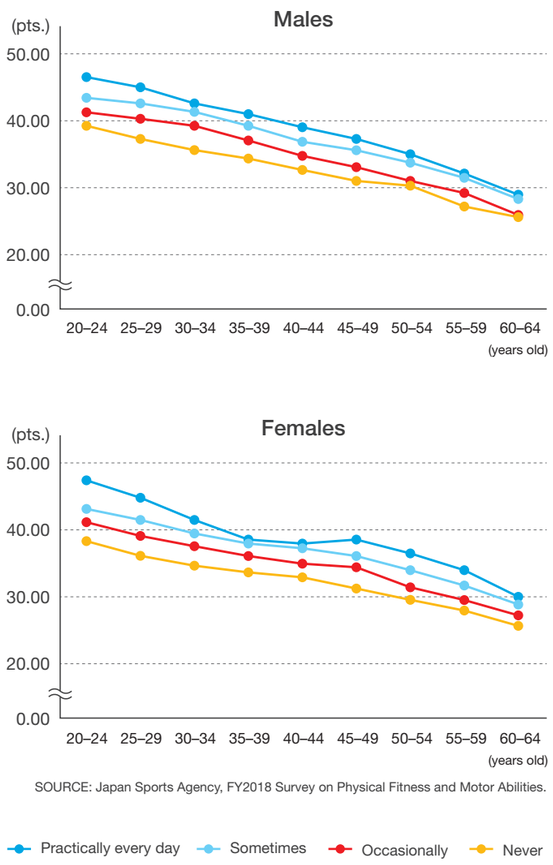
# Learn: How does locomotive syndrome relate to regular exercise, healthy life expectancy, and frailty?

## Locomotive syndrome and regular exercise

Moving your body to subject it to mechanical stress as part of your daily routine helps maintain a healthy locomotor system. That's why it's essential to get into the habit of engaging in moderate exercise and to keep working the locomotor system responsibly from a young age to stave off locomotive syndrome.

Regular exercise has a major effect on overall fitness. According to a study by the Japan Sports Agency, the more frequently people exercised or played sports, the better they performed on physical fitness tests, regardless of their age. 50-year-olds who exercise practically every day were found to be more fit than 30-year-olds who do not engage in regular exercise (see the graph below).

### ■ Physical fitness test results by frequency of exercise and sports activities

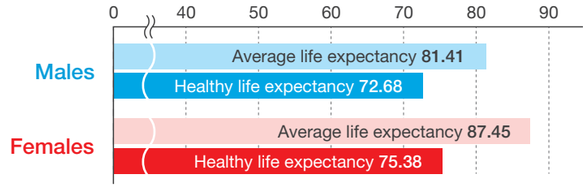



SOURCE: Japan Sports Agency, FY2018 Survey on Physical Fitness and Motor Abilities.

## How do you extend your healthy life expectancy?

Healthy life expectancy means the number of years you can expect to live in good health. While Japan is known for having one of the highest life expectancies in the world, the difference between its average life expectancy and healthy life expectancy is about nine years for men and 12 years for women. During this differential period, health problems encroach on daily life, necessitating some form of assistance. If they worsen, the possibility of requiring nursing care rises.

### ■ Difference between average life expectancy and healthy life expectancy in Japan




SOURCES: For average life expectancy (2019), Japanese Ministry of Health, Labour and Welfare, Complete Life Tables 2019; for healthy life expectancy (2019), Japanese Ministry of Health, Labour and Welfare, Vital Statistics(2019), Comprehensive Survey of Living Conditions(2019), Ministry of Internal Affairs and Communications, Population Estimates(2019).

To extend your healthy life expectancy and bridge the gap with the average life expectancy, you need to improve so that musculoskeletal problems encroach less on daily life—before you reach the stage of requiring special assistance or nursing care. This is locomotive syndrome prevention.

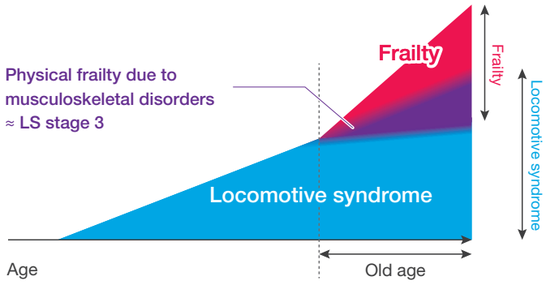
## How are locomotive syndrome and frailty related?

Have you heard of "frailty"? Frailty is a condition among older populations in which physiological reserves* decline to the point that nursing care becomes all but necessary. According to the Japan Geriatrics Society, there are physical, mental/psychological, and social factors behind frailty, with physical frailty being closely related to locomotive syndrome.

Locomotive syndrome manifests earlier in life compared to frailty. Physical frailty is a condition in which the progression of locomotive syndrome results in marked declines in physical capabilities along with subjective symptoms. "LS stage 3" (▶ see page 13) results in limited social participation due to declines in mobility and arguably corresponds to physical frailty.

*The ability to recover from alterations due to external stressoras.

### ■ Relationship between locomotive syndrome and physical frailty (visual representation)




*Areas do not represent the numbers of corresponding individuals.

## How can you check if you have locomotive syndrome?

Three tests assess if you have locomotive syndrome. They are collectively called the "locomotive syndrome risk test." First is the "stand-up test," which measures the height at which a person can stand up on one or both legs. Second is the "two-step test," which measures the distance covered in two steps while striding as far as possible. Third is a "25-question geriatric locomotive function scale (GLFS-25)". Depending on the results of these tests, you can be deemed not at risk of locomotive syndrome or in its early stages (**LS stage 1**), advanced stages (**LS stage 2**), or very advanced stages (**LS stage 3**) that result in limited social participation. As mentioned before, LS stage 3 corresponds to "physical frailty due to disorders of the locomotor system."


▶ Stand-up test See page 6.
▶ Two-step test See page 8.
▶ GLFS-25 See page 10.

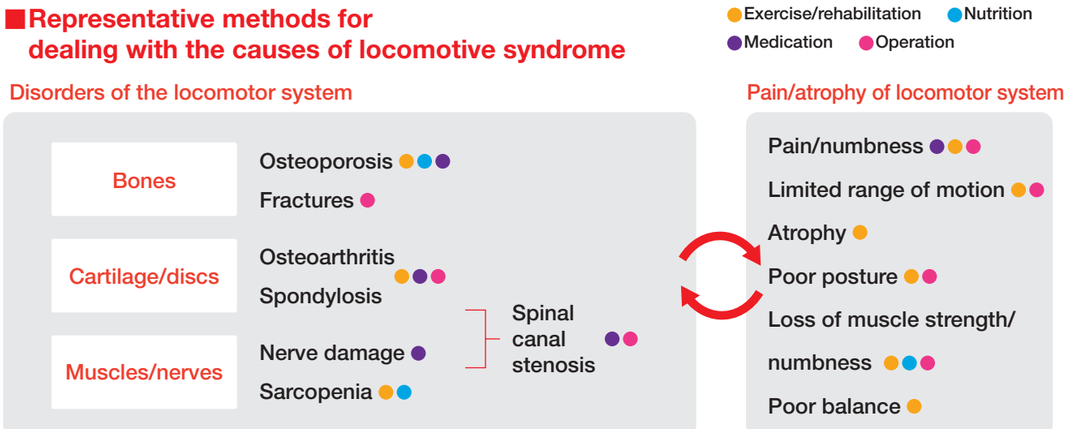

## How can you stop locomotive syndrome from progressing?

Locomotive syndrome has a variety of causes, ranging from musculoskeletal illnesses and declines in musculoskeletal capacity to musculoskeletal pain. It arises when these causes coalesce. Social participation and daily activities become more and more limited as it progresses, until nursing care finally becomes a necessity. If you're found to have it, you have to determine its specific causes and take actions appropriate for your condition.

Appropriate courses of action include illness prevention, medicinal and surgical treatments for illnesses, strength and balance training to fight declines in musculoskeletal strength, treatments for pain and numbness, and amelioration of malnutrition and overnutrition. Lifestyle disease prevention and treatments are also necessary.

What sets locomotive syndrome apart is that you can recover from it. Properly address it and you'll be able to walk without any worries or problems.

### ■ Representative methods for dealing with the causes of locomotive syndrome




*There are other methods to deal with besides the above.

# Assess: Locomotive syndrome risk test 1

Assess your mobility.
The locomotive syndrome risk test briefly determines your risk of locomotive syndrome.

*Mobility is defined as the ability to stand, walk, run, sit, climb the stairs, and perform other physical functions essential to daily life.

## What is the locomotive syndrome risk test?

The "locomotive syndrome risk test" consists of three parts.
If your results are poor for any one of these, you have locomotive syndrome.

1. **Stand-up test** (for assessing leg strength)
2. Two-step test (for assessing the length of your steps)
3. GLFS-25 (for assessing your physical condition and lifestyle)

## 1 The stand-up test (for assessing leg strength)

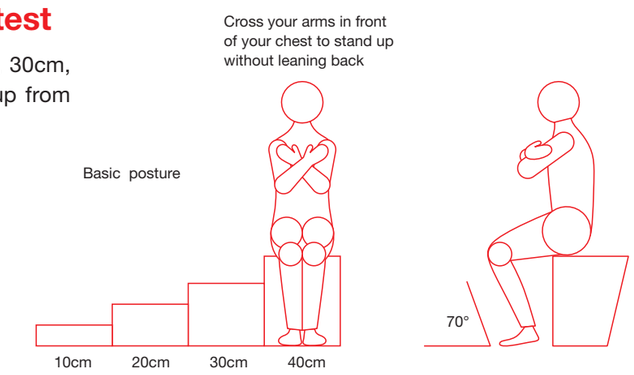
This test measures your leg strength by having you stand up on one or both legs from a sitting position to assess your risk level. Since mobility declines when leg strength decreases, you may have locomotive syndrome if you have trouble standing up.

### How to conduct the stand-up test

Prepare four seats of different heights – 40cm, 30cm, 20cm, and 10cm. Starting from 40cm, stand up from each, first with both legs, then with one leg.

**Points to note**

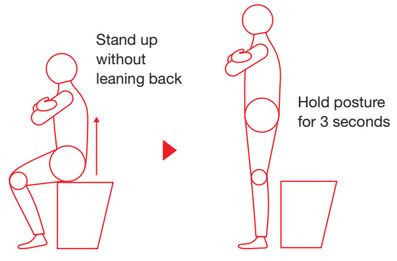
- Be careful not to strain or injure yourself.
- If your knees start to hurt, stop the test.
- Do not lean back to gain momentum: you could topple backwards.




SOURCE: Shingo Muranaga, *Journal of the Showa Medical Association* (2001) 61(3):362-367.

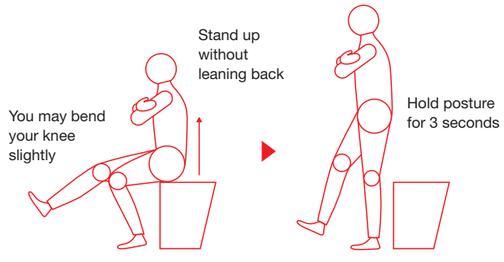
### On both legs

Sit on the 40 cm seat, arms folded. Spread your legs to the width of your shoulders, with your shins at an angle of 70 degrees to the floor (in the case of the 40cm seat). Then stand up, without leaning back to gain momentum, and maintain posture for three seconds.




### On one leg

If you can stand up from 40 cm height on both legs, next try it on one leg. Resume the basic posture, and raise either your right or left leg, bending the knee slightly. Stand up without leaning back to gain momentum, and maintain posture for three seconds.




**Check out this instructional video!**

The Japanese Orthopaedic Association's official website for prevention and awareness of locomotive syndrome
https://youtu.be/QY4P9TNJU68

## Test procedure and results

### 1. Start with both legs from 40 cm height.

Start with both legs from 40 cm height. If you fail, you are at LS stage 3.
If you succeed, try standing up on one leg from the same height.

### 2. If you succeed/fail in single-leg stand-up from 40 cm height

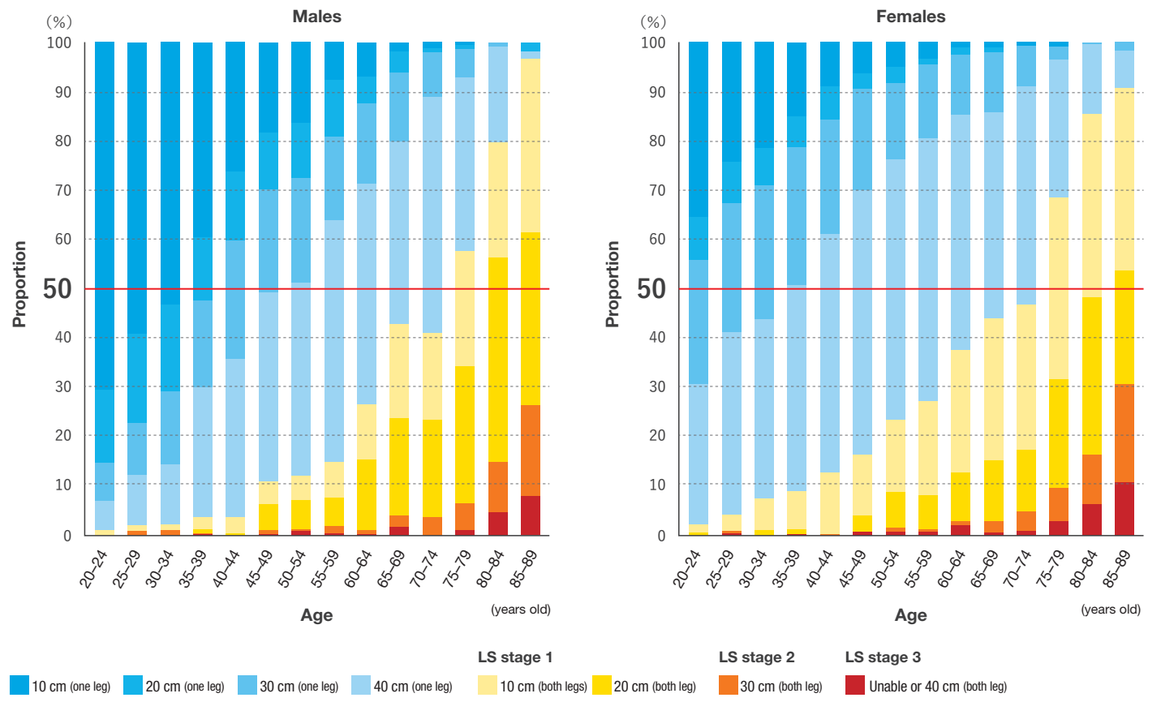
**Success** Move on to testing one leg at a time from lower heights in decrements of 10 centimeters. The lowest height from which you can stand both on your left leg and on your right leg is your test result.

**Failure** Starting from 30 cm height, stand up with both legs and move on to lower heights in decrements of 10 centimeters if you succeed. The lowest height from which you can stand on both legs is your test result.

[Relative difficulty of standing from each height]
40cm, both legs<30cm, both legs<20cm, both legs<10cm, both legs<40cm,one leg<30cm, one leg <20cm, one leg <10cm, one leg

### Proportion of stand-up test results by age*

*Created using study results for 8,681 independent community dwellers who were not under treatment for disorders of the locomotor system and could walk without assistance of caregivers.
SOURCE: Keiko Yamada, et al, *Journal of Orthopaedic Science* 25, no. 6 (2020): 1084–92.




The x- and y-axes represent people's ages and the proportions of regions including their stand-up test results, respectively. If a region corresponding to a given test result is above the red 50% line, it signifies a result better than those achieved by half of the people of the same age. The gradient from blue to yellow to orange to red represents declines in vertical mobility, with the blue, yellow, orange, and red regions corresponding to no risk of locomotive syndrome, LS stage 1, LS stage 2, and LS stage 3, respectively.

How bad is each risk level? ▶ See page 12–13.

# Assess: Locomotive syndrome risk test 2

**What is the locomotive syndrome risk test?**

**The "locomotive syndrome risk test" consists of three parts.**
If your results are poor for any one of these, you have locomotive syndrome.

1. Stand-up test (for assessing leg strength)
2. **Two-step test (for assessing the length of your steps)**
3. GLFS-25 (for assessing your physical condition and lifestyle)

## 2 Two-step test (for assessing the length of your steps)

This test assesses your risk level using the length of your steps.
By assessing the length of your steps, it also comprehensively assesses your walking ability, including the strength, balance, and flexibility of your lower body.

### How to conduct the two-step test

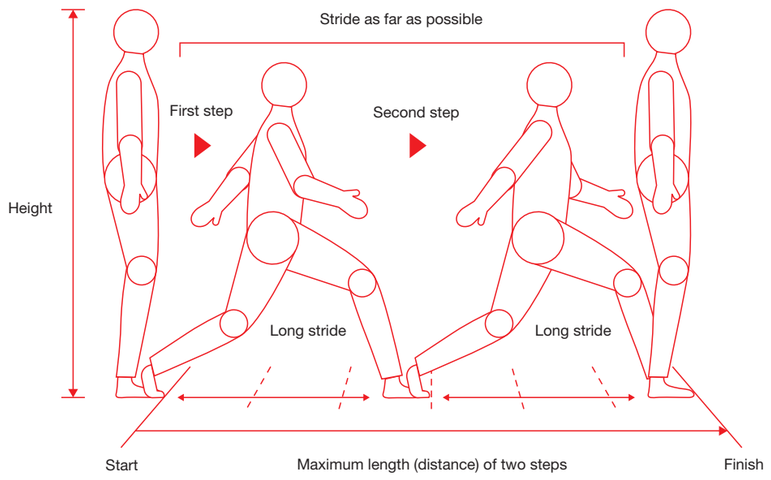
1. Decide your starting line and stand with the toes of both feet behind it.
2. Take two steps while striding as far as you can. Then align both feet. (If you lose your balance, treat the attempt as a failure and start over.)
3. Measure the length of your two steps (from the starting line to the tips of your toes where you stopped).
4. Do the test twice and record the better result.
5. Calculate your two-step score using the following formula.

**Total length of two steps (cm)**
**÷ your height (cm)**
**= your two-step score**

**Points to note**

- Do the test in the presence of a caregiver.
- Do the test on a non-slippery surface.
- Do warm-up exercises first.
- Go as far as you can without losing your balance.
- No jumping.

SOURCE: Shingo Muranaga, et al, *Journal of the Showa Medical Association* 63, no. 3 (2003): 301–8.

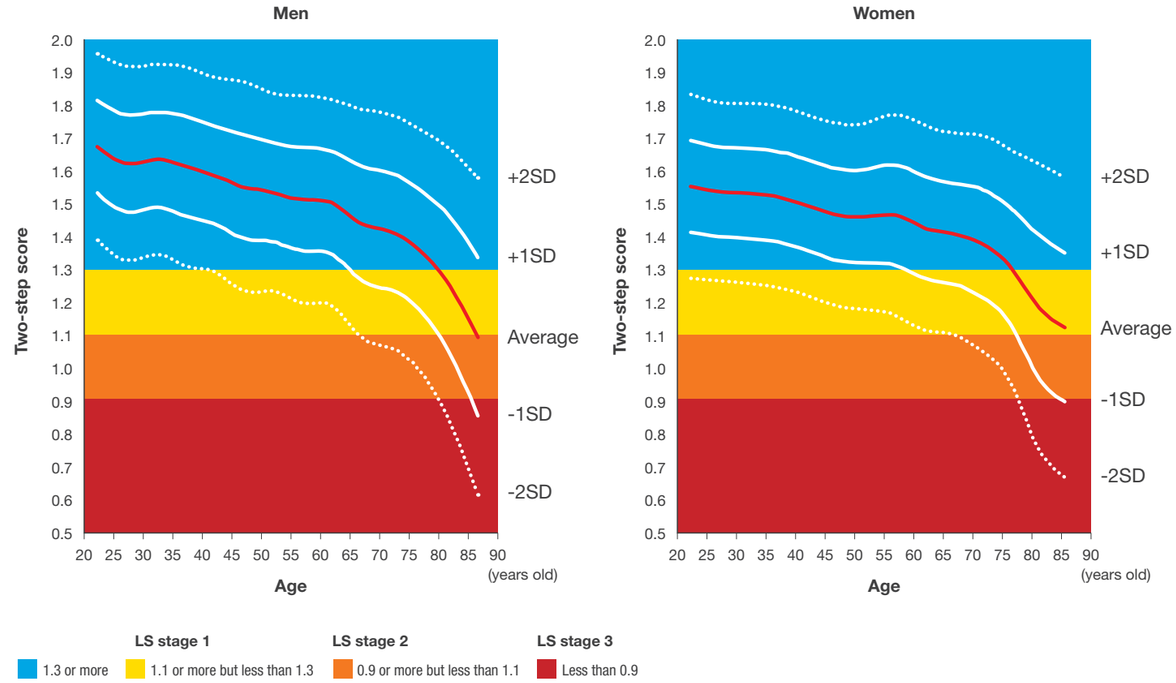



**Check out this instructional video!**

The Japanese Orthopaedic Association's official website for prevention and awareness of locomotive syndrome
https://youtu.be/QY4P9TNJU68

### Two-step scores by age*

*Created using study results for 8,681 independent community dwellers who were not under treatment for disorders of the locomotor system and could walk without assistance of caregivers.
SOURCE: Keiko Yamada, et al, *Journal of Orthopaedic Science* 25, no. 6 (2020): 1084–92.




The x- and y-axes represent people's ages and two-step scores, respectively.
The red curve represents the average score at each age.
The white curves above and below the red curve represent numerical values based on standard deviations. The upper +1SD and +2SD curves are one standard deviation and two standard deviations higher than the average (corresponding to percentile ranks of 60% and 70%), respectively. On the other hand, the lower –1SD and –2SD curves are one standard deviation and two standard deviations lower than the average (corresponding to percentile ranks of 40% and 30%), respectively.
The horizontal regions in the background represent mobility in descending order (from blue to yellow to red), with the blue, yellow, orange, and red regions corresponding to no risk of locomotive syndrome, LS stage 1, LS stage 2, and LS stage 3, respectively.

How bad is each risk level? ▶ See page 12–13.

# Assess: Locomotive syndrome risk test 3

**What is the locomotive syndrome risk test?**

**The "locomotive syndrome risk test" consists of three parts.**
If your results are poor for any one of these, you have locomotive syndrome.

1 **Stand-up test** (for assessing leg strength)

2 **Two-step test** (for assessing the length of your steps)

3 **GLFS-25** (for assessing your physical condition and lifestyle)

## 3 25-question geriatric locomotive function scale (GLFS-25) (for assessing your physical condition and lifestyle)

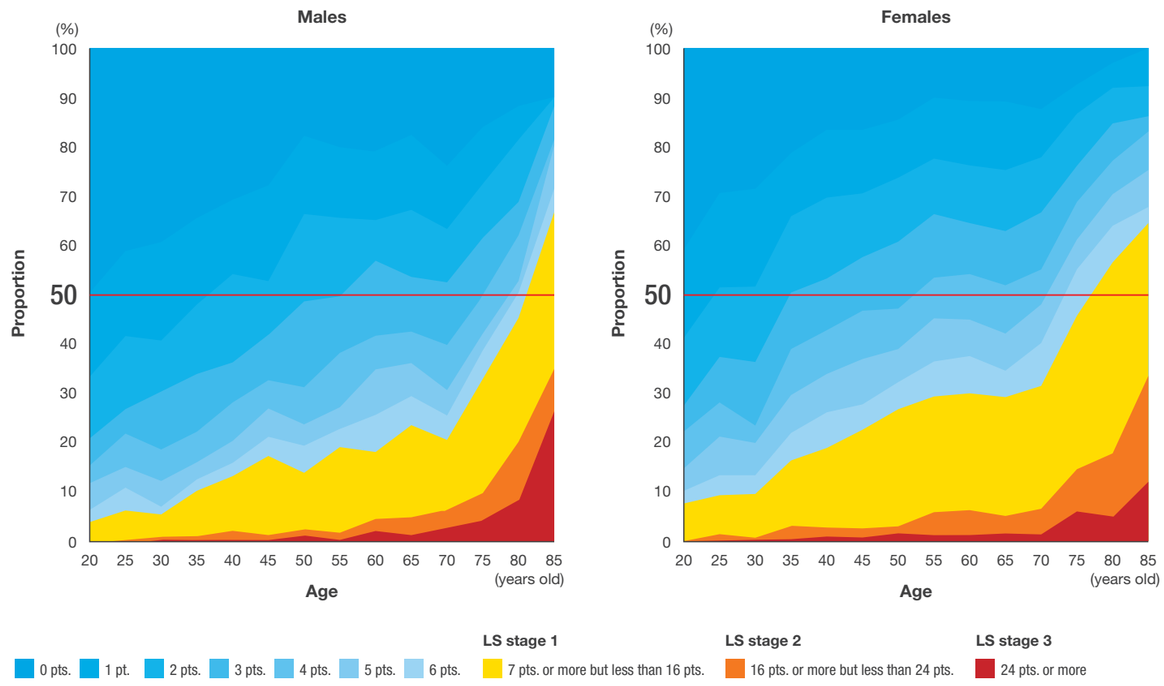
This test assesses your risk level based on your physical condition and lifestyle.
Answer the following 25 questions to assess subjective symptoms related to your locomotor system.

| | | | | | | |
|---|---|---|---|---|---|---|
| **The following are questions about any physical pain experienced in the past one month:** | | | | | | |
| Q1 | Did you have any pain (including numbness) in your neck, shoulders, arms, or hands? | No pain | Slight pain | Moderate pain | Considerable pain | Extreme pain |
| Q2 | Did you have any pain in your back, lower back, or buttocks? | No pain | Slight pain | Moderate pain | Considerable pain | Extreme pain |
| Q3 | Did you have any pain (including numbness) in your lower body (pelvic region, thighs, knees, calves, shins, ankles, or feet)? | No pain | Slight pain | Moderate pain | Considerable pain | Extreme pain |
| Q4 | To what extent has it been painful to move your body in daily life? | Not painful | Slightly painful | Moderately painful | Considerably painful | Extremely painful |
| **The following are questions about your everyday life in the past one month:** | | | | | | |
| Q5 | To what extent has it been difficult to get up from a bed or lie down? | Not difficult | Slightly difficult | Moderately difficult | Considerably difficult | Extremely difficult |
| Q6 | To what extent has it been difficult to stand up from a sitting position? | Not difficult | Slightly difficult | Moderately difficult | Considerably difficult | Extremely difficult |
| Q7 | To what extent has it been difficult to walk inside your residence? | Not difficult | Slightly difficult | Moderately difficult | Considerably difficult | Extremely difficult |
| Q8 | To what extent has it been difficult to put on and take off shirts? | Not difficult | Slightly difficult | Moderately difficult | Considerably difficult | Extremely difficult |
| Q9 | To what extent has it been difficult to put on and take off pants and underwear? | Not difficult | Slightly difficult | Moderately difficult | Considerably difficult | Extremely difficult |
| Q10 | To what extent has it been difficult to use the toilet? | Not difficult | Slightly difficult | Moderately difficult | Considerably difficult | Extremely difficult |
| Q11 | To what extent has it been difficult to wash your body in a bath? | Not difficult | Slightly difficult | Moderately difficult | Considerably difficult | Extremely difficult |
| Q12 | To what extent has it been difficult to go up and down stairs? | Not difficult | Slightly difficult | Moderately difficult | Considerably difficult | Extremely difficult |
| Q13 | To what extent has it been difficult to walk briskly? | Not difficult | Slightly difficult | Moderately difficult | Considerably difficult | Extremely difficult |
| Q14 | When going out, to what extent has it been difficult to keep yourself neat? | Not difficult | Slightly difficult | Moderately difficult | Considerably difficult | Extremely difficult |
| Q15 | How far can you keep walking without rest? (Select the closest answer.) | 2 km or more | About 1 km | About 300 m | About 100 m | About 10 m |
| Q16 | To what extent has it been difficult to go next door or around your neighborhood? | Not difficult | Slightly difficult | Moderately difficult | Considerably difficult | Extremely difficult |
| Q17 | To what extent has it been difficult to carry objects weighing about two kilograms (roughly the weight of two one-liter milk cartons)? | Not difficult | Slightly difficult | Moderately difficult | Considerably difficult | Extremely difficult |
| Q18 | To what extent has it been difficult to go out using trains or buses? | Not difficult | Slightly difficult | Moderately difficult | Considerably difficult | Extremely difficult |
| Q19 | To what extent has it been difficult to perform light housework (such as preparing and cleaning dishes or simple housekeeping)? | Not difficult | Slightly difficult | Moderately difficult | Considerably difficult | Extremely difficult |
| Q20 | To what extent has it been difficult to perform somewhat heavy housework (such as vacuuming or carrying mattresses and bedding)? | Not difficult | Slightly difficult | Moderately difficult | Considerably difficult | Extremely difficult |
| Q21 | To what extent has it been difficult to participate in sports or dances (such as jogging, swimming, or gateball)? | Not difficult | Slightly difficult | Moderately difficult | Considerably difficult | Extremely difficult |
| Q22 | Have you had to refrain from meeting close friends and acquaintances? | Did not refrain | Slightly refrained | Moderately refrained | Considerably refrained | Completely refrained |
| Q23 | Have you had to refrain from community activities or events? | Did not refrain | Slightly refrained | Moderately refrained | Considerably refrained | Completely refrained |
| Q24 | Have you felt anxious about falling in your residence? | Not anxious | Slightly anxious | Moderately anxious | Considerably anxious | Extremely anxious |
| Q25 | Have you felt anxious about being unable to walk in the future? | Not anxious | Slightly anxious | Moderately anxious | Considerably anxious | Extremely anxious |
| Fill in the number of answers ▶ | | 0 pts. = | 1 pt. = | 2 pts. = | 3 pts. = | 4 pts. = |
| Add up the number of points ▶ | | Total: pt(s). | | | | |



### Proportion of GLFS-25 scores by age*

*Created using study results for 8,681 independent community dwellers who were not under treatment for disorders of the locomotor system and could walk without assistance of caregivers.
SOURCE: Keiko Yamada, et al, *Journal of Orthopaedic Science* 25, no. 6 (2020): 1084–92.

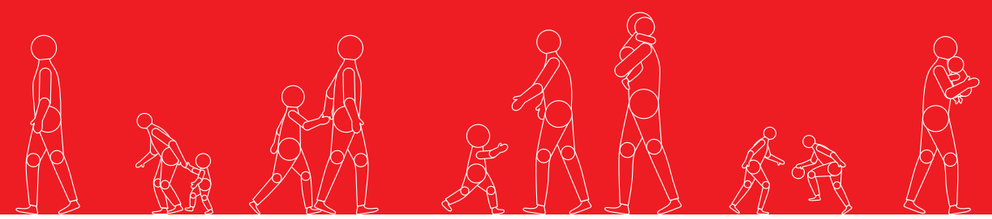



The x- and y-axes represent people's ages and the proportions of regions including their GLFS-25 scores, respectively.
If a region corresponding to a given score is above the red 50% line, it signifies a score better than those achieved by half of the people of the same age. The gradient from blue to yellow to orange to red represents increases in the number of subjective symptoms related to the locomotor system, with the blue, yellow, orange, and red regions corresponding to no risk of locomotive syndrome, LS stage 1, LS stage 2, and LS stage 3, respectively.

How bad is each risk level? ▶ See page 12–13.

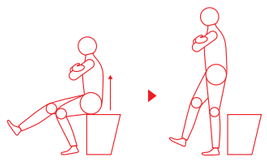
# Assess: Locomotive syndrome risk* assessments and courses of action

*Represents declining mobility from LS stage 1 to LS stage 2 to LS stage 3.



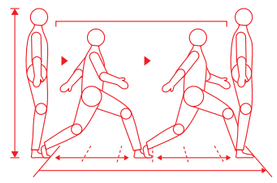
Based on the results of the following tests,

### Stand-up test



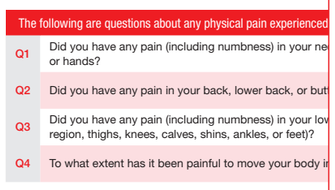
▶ See page 6.

### Two-step test



▶ See page 8.

### GLFS-25




▶ See page 10.

assess your locomotive syndrome risk level (LS stage) based on your current mobility.
The test results will help you determine if you fall under LS stage 1, LS stage 2, or LS stage 3.
Among the risk levels that apply to you, the one where your mobility has declined the most is your assessment result.
If none apply, you do not have locomotive syndrome.

---

LS stage 1

## Your mobility is starting to decline.

| Stand-up test | Two-step test | GLFS-25 |
|---|---|---|
| Can't stand up from 40 cm height on one leg or the other but can stand up from 20 cm height on both legs | 1.1 or more but less than 1.3 | 7 points or more but less than 16 points |

Your muscular strength and balance are starting to deteriorate, so you need to get into the habit of performing regular exercise, such as locomotion training (▶ see page 14–15). Also, take care to eat a balanced diet with plenty of protein and calcium.

LS stage 2

## The decline in your mobility is progressing.

| Stand-up test | Two-step test | GLFS-25 |
|---|---|---|
| Can't stand up from 20 cm height on both legs but can stand up from 30 cm height | 0.9 or more but less than 1.1 | 16 points or more but less than 24 points |

You're at high risk of becoming unable to lead an independent lifestyle. In particular, if you're also experiencing pain, you may be showing signs of a disease of the locomotor system, so it's recommended you see an orthopaedist.

---

LS stage 3

## The decline in your mobility has progressed to the point that your social participation is limited.

| Stand-up test | Two-step test | GLFS-25 |
|---|---|---|
| Can't stand up from 30 cm height on both legs | Less than 0.9 | 24 points or more |

You're at extremely high risk of becoming unable to lead an independent lifestyle.
You may require treatment for a disease of the locomotor system, so it's recommended you get diagnosed and treated by an orthopaedist.

# Exercise: Locomotion training (LT)

**Keep your lower body fit for life by making locomotion training a habit.**
**Locomotion training (LT) consists of just two exercises: one-leg stands and squats.**
**The severity of locomotive syndrome varies from person to person. Train safely and responsibly.**

## LT 1 Single-leg standing

for improving your balance

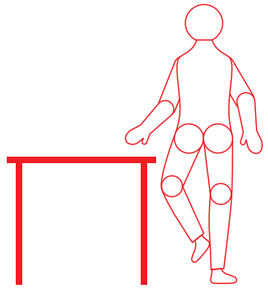
**Do three times a day, one minute for each leg.**

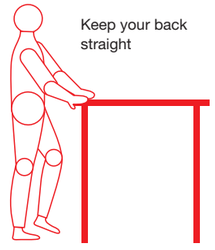
**1.**

Make sure to stand where there's something to grab on to, so you don't fall over.

**2.**

Raise your leg so it's just off the floor.






**Tips**

·If you require something to lean on, carefully place your hands or fingers on a table.

## LT 2 Squats

for strengthening your leg muscles

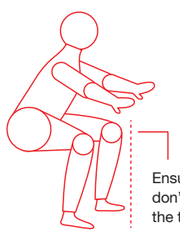
**Repeat 5-6 times in sync with deep breathing.**
**Do three times a day.**

**1.**

Stand with your legs shoulder-width apart.

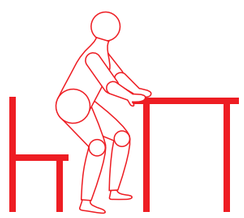
**2.**

Lower your body while pushing your buttocks back. Take over 2-3 seconds to bend your knees, then return to the standing position slowly.




### If unable to do squats:

Sit on a chair with your hands on a table and repeatedly stand up and sit down. If you can do the exercise without touching, hold your hands just above the table.



**Tips**

- Do not hold your breath while doing the squat.
- Avoid bending well over 90 degrees.
- If you require something to lean on, carefully place your hands or fingers on a table.
- You can increase the repetitions or sets if you feel easy to do squats.

**The instructional video introduces locomotion training and two additional exercises: heel raises and front lunges.**

The Japanese Orthopaedic Association's official website for prevention and awareness of locomotive syndrome

**https://locomo-joa.jp/check/locotre/**



# Got a sore back or knees?

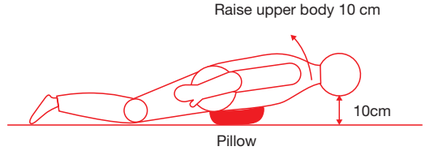
These exercise can help bring relief!
If you have pain or other symptoms, consult with a medical professional before trying these exercises.

## Back Exercises for back pain

**Do three sets of 10 reps for each excercise every day.**

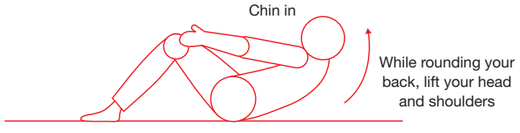
### 1. Back stretches

Lie face down with a pillow under your stomach. Slowly raise your upper body about 10 cm off the floor. Hold posture for 5-10 seconds, then lower down slowly.




### 2. Half sit-ups

Lie facing upward. Slowly lift your head and shoulders, while rounding your back by tensing your abdominal muscles. Hold posture for 5-10 seconds, and then lower down slowly.

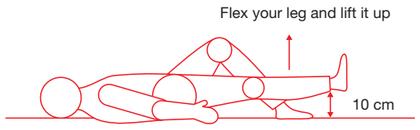



## Knee Exercises for knee pain

**Do three sets of 10 reps for each leg every day.**

### Toning the Quadriceps (the muscles at the front of the thigh)

Lie facing upward with one knee straight by tensing your thigh muscle. Keeping tension, raise the foot 10 cm off the floor. Hold posture for 5-10 seconds, then lower down slowly. Repeat with the other leg.




## How often and how long should you exercise? Aim for 30 minutes twice a week!

Perform exercises that may leave you out of breath and sweaty (3 METs or more) for 30 minutes or more twice a week to prevent locomotive syndrome.
METs are numerical representations of intensities for various exercises and everyday physical activities, with 1 MET being the intensity of just sitting at rest.
For example, walking a dog (3.0 METs) burns three times more calories than being at rest (1 MET).

### Exercises that may leave you out of breath and sweaty (3 METs or more)

- Social dances and tai chi **3.0** METs
- Radio calisthenics (#1) **4.0** METs
- Table tennis **4.0** METs
- Brisk walking **4.3** METs
- Water walking **4.5** METs
- Slow jogging **6.0** METs

SOURCE: National Institute of Health and Nutrition, Revised "METs Table of Physical Activity."

# Eat: Get proper nutrition!

The building blocks for your bones and muscles come from your daily meals. Keep locomotive syndrome at bay by following a proper diet.

**If you don't get enough calories, let alone protein, you'll lose body weight and muscle mass.**

No matter how much you exercise, if you don't eat properly, you'll lose body weight and muscle mass. As with your bones, an adequate supply of the right building blocks is necessary to increase muscle mass and strength. While protein is one of these key building blocks, it's also important to obtain plenty of carbohydrates and fat, which supply energy. That's because if your body doesn't get enough energy in the form of calories, it will try to generate energy using the protein that makes up your muscles.

**In addition to calcium, make sure to get plenty of nutrients like protein, vitamin D, and vitamin K.**

Besides just calcium, you also need protein, vitamin D, and vitamin K to build strong bones.

## Protein

Protein is a key building block for bones, so be sure to get enough of it. Meat, fish, milk, and soybeans are all sources of high-quality protein with a good amino acid balance.

## Vitamin D

Vitamin D increases calcium absorption in the gut and occurs in large amounts in fish like salmon as well as mushrooms. While it can also be synthesized in your skin when you're in direct sunlight, it's important to include plenty of it in your diet so you don't come up short.

## Vitamin K

Vitamin K plays a role in forming bones and maintaining bone quality and occurs in large amounts in fermented natto soybeans and green vegetables like cabbage and broccoli.

## Other nutrients for building strong bones

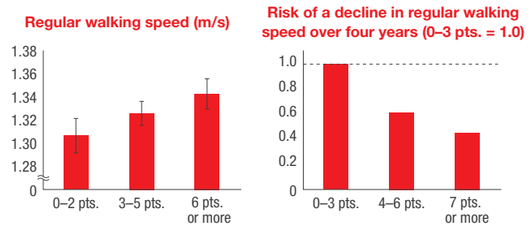
Other nutrients critical for strong bones include magnesium, vitamin $B_6$, vitamin $B_{12}$, and folic acid, which you should also aim to intake in various combinations as integral parts of your daily diet. Magnesium occurs in large amounts in foods like soybean products, seaweed, and seafood. Large amounts of vitamin $B_6$ occur in foods like liver, chicken, skipjack, tuna, and bell peppers; vitamin $B_{12}$ in foods like liver, saury, and littleneck clams; and folic acid in vegetables like spinach and chrysanthemum greens as well as strawberries.

## Eat a balanced diet!
## Fresh Foods Make Meals Very Satisfying, Promoting Energy, Satiety, and Flavor

| | | |
|---|---|---|
| **F**ish | Rich in animal protein, calcium, and vitamin D | pt(s). |
| **F**at | Moderate amounts of fats and oils are necessary for creating cells | pt(s). |
| **M**eat | Excellent source of high-quality protein | pt(s). |
| **M**ilk | Rich in protein and calcium | pt(s). |
| **V**egetables | Packed with vitamins and dietary fiber | pt(s). |
| **S**eaweed | Low in calories and rich in minerals and dietary fiber | pt(s). |
| **P**otatoes | Calorie-dense due to their carbs and come with vitamins and minerals | pt(s). |
| **E**ggs | Easy source of protein with various cooking options | pt(s). |
| **S**oybeans | Rich in essential amino acids—the building blocks of protein—and calcium | pt(s). |
| **F**ruits | Rich in minerals and vitamins and a source of dietary fiber | pt(s). |
| Award yourself 1 point if you eat a given category practically every day. Otherwise, you get no points. How did you score? | | pt(s). |

**Aim for 7 points or more every day.**

### ■ Dietary diversity score and walking speed




According to the Tokyo Metropolitan Geriatric Hospital and Institute of Gerontology, the higher the number of the 10 foods in the mnemonic above eaten practically every day (referred to as your "dietary diversity score"), the faster your walking speed (upper-left graph, Doc. 1) and the lower your risk of a decline in walking speed over a four-year longitudinal study (upper-right graph, Doc. 2).

Doc. 1: Yuri Yokoyama, et al, *The Journal of Nutrition, Health and Aging* 20, no. 7 (2016): 691–6.
Doc. 2: Yuri Yokoyama, et al, *The Journal of Nutrition, Health and Aging* 21, no. 1 (2017): 11–16.



## Examples of foods to have daily for your bones and muscles

**Foods rich in protein (50 g or 65 g per day)*1**


Chicken breast (skinless; 60 g) 14.0 g


Mackerel (1 slice) 16.5 g


Firm tofu (1/3 block) 7.0 g


Chicken egg (1 egg) 6.2 g

**Foods rich in calcium (700–800 mg per day)*2**


Milk (1 cup) 231 mg


Sardine (whole-dried; 2 medium-sized fish) 132 mg


Mustard spinach (1/4 bunch) 136 mg


Firm tofu (1/2 block) 129 mg

**Foods rich in vitamin D (10–20 µg per day)*2**


Salmon (raw; 1 slice) 25.6 µg


Japanese sardine (raw; 2 fish) 64.0 µg


Wood ear mushroom (dried; 2 pieces) 1.7 µg


Hen of the woods (raw; 1/4 bunch) 1.0 µg

**Foods rich in vitamin K (250–300 µg per day)*2**


Sticky natto (1 pack) 300 µg


Broccoli (raw; 3–4 florets) 112 µg


Spinach (raw; 1/4 bunch) 162 µg

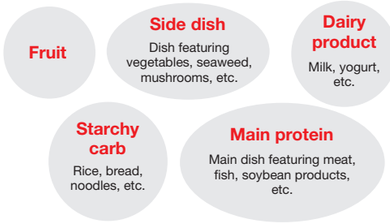

Matcha (1 tsp) 58 µg

*Descriptions enclosed in parentheses represent one serving size, while numerical values at the bottom represent the respective nutrient content.
*1: 50 g for adult women and 65 g for adult men, according to *Dietary Reference Intakes for Japanese* (2020). *2: According to *2015 Guidelines for Prevention and Treatment of Osteoporosis*.
SOURCE: *Standard Tables of Food Composition in Japan -2015-*. *For other foods and details, see the URL below for the official website for locomotive syndrome prevention and awareness.

## Keep locomotive syndrome at bay with readily available, everyday foods

The key to preventing locomotive syndrome through nutrition lies in your daily meals. It's important to obtain a balanced combination of nutrients when eating your three daily meals. To do so, aim to include a starchy carb, a main protein, and a side dish with every meal, have a colorful array of foods on your plate, and consume an appropriate amount of milk, dairy products, and fruit every day. Also, make sure to get enough protein for your bones and muscles, as well as calcium (Ca), vitamin D (VD), and vitamin K (VK), which tend to be lacking. Keep "**F**resh **F**oods **M**ake **M**eals **V**ery **S**atisfying, **P**romoting **E**nergy, **S**atiety, and **F**lavor" in mind when planning your meals. Here are some meal ideas using foods that are readily available at convenience stores and supermarkets.

### Meal basics

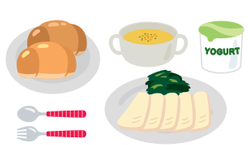



**When you have the basics down, it becomes easier to get a nice balance of nutrients.**

**Daily meal ideas**

*Standard Tables of Food Composition in Japan -2015- (Seventh Revised Edition)*, appended in 2016, 2017, and 2018.
*Gaishoku, konbini, sozai no karori gaido* [Calorie guide for restaurants, convenience stores, and prepared foods], Kagawa Nutrition University Publishing Division.

### Breakfast




Yogurt (1 container), sautéed spinach (60 g), cream of corn soup (150 g), bread rolls (2 pieces), and half a slice of steamed chicken breast (50 g)

Calories: 510 kcal Protein: 33.8 g
Ca: 282 mg VD: 0.41 µg VK: 225 µg

### Lunch

Mung bean sprout namul (60 g), milk (200 mL), salmon rice balls (2 pieces), and a large piece of canned boiled mackerel (50 g)

Calories: 636 kcal Protein: 27.7 g
Ca: 419 mg VD: 10.0 µg VK: 104 µg

### Dinner

Boiled or chilled tofu (100 g), raw veggie salad (1 cup), rice ball (1 piece), and shrimp gratin (200 g)

Calories: 531 kcal Protein: 20.2 g
Ca: 293 mg VD: 0.4 µg VK: 99 µg

**Daily nutritional intake**

**Calories: 1,677 kcal Protein: 81.7 g Ca: 994 mg VD: 10.8 µg VK: 428 µg**

*For the daily recommended intake for women, see the official website for locomotive syndrome prevention and awareness.

**Check out detailed dietary advice!**

The Japanese Orthopaedic Association's official website for prevention and awareness of locomotive syndrome
https://locomo-joa.jp/check/food/

# Locomotive Syndrome Channel Plus

**In addition to locomotion training exercises, aim to incorporate some easy exercises that help to prevent locomotive syndrome into your everyday life.**

On the official website for locomotive syndrome prevention and awareness, orthopaedists and healthcare professionals across Japan share exercise tutorials and advice through the Locomotive Syndrome Channel. Here are two examples.

### Slowly standing up and sitting down over five seconds

Dr. Hiroshi Okazaki, Vice Director of Kanto Rosai Hospital

**Squat training by standing up and sitting down over five seconds**


### Little walking tweaks

Prof. Kojiro Ishii, Faculty of Health and Sports Science, Doshisha University

**Regular and brisk walking and slow jogging**


## Do you know about locomotive syndrome advisors?

**For the general public**

If you're worried you might have locomotive syndrome or you're experiencing symptoms like pain or numbness in your lower body, don't wait—reach out to your nearest locomotive syndrome advisor, who will show you appropriate courses of action.

**For municipalities and companies**

If you want to raise awareness of locomotive syndrome prevention in your community or company, reach out to your local locomotive syndrome advisor, who will help with any inquiries concerning topics such as locomotive syndrome lectures.

**For orthopaedists**

The Locomotive Challenge! Council depends on everyone's cooperation to raise awareness of accurate locomotive syndrome information and prevention. Feel free to register to become a locomotive syndrome advisor.

**You can search for local locomotive syndrome advisors!**

TThe Japanese Orthopaedic Association's official website for prevention and awareness of locomotive syndrome

https://locomo-joa.jp/advice_doctor/



## Locomotive syndrome prevention is gaining traction

To help people build healthy bodies capable of walking independently for life as well as physical fitness for working safely, more and more communities and companies are engaging in efforts to prevent locomotive syndrome.

### Case 1: Miyazaki Prefecture

**Prefecture-wide initiatives turn Miyazaki into a leader in terms of locomotive syndrome awareness**



Various tools are created to spread awareness of locomotive syndrome

A machine jointly developed with the University of Miyazaki used for locomotive syndrome measurements and assessments


A locomotive syndrome exam

Miyazaki Prefecture is promoting its "Locomo the World Miyazaki" vision and working on locomotive syndrome prevention through collaborations between industries, the government, and academia.

Besides putting effort into various exams like musculoskeletal exams for elementary and junior high school students as well as lectures and taking preemptive countermeasures, the prefecture also established various age-appropriate measures and systems. These range from locomotive syndrome exams during specific health checkups to health classes centered around the condition and phone calls to high-risk seniors.

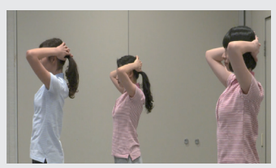
Based on residents' health data, the prefecture is leveraging the strengths of industry-government-academia collaboration to promote complex initiatives, such as the joint development of machines and equipment for locomotive syndrome measurements with the University of Miyazaki and the training of Locomomates to educate communities on prevention. Through means like prefecture-wide commercials and daily tear-off calendars provided by the city of Miyazaki, locomotive syndrome became a household name, turning Miyazaki Prefecture into a leader* in terms of locomotive syndrome awareness.

*According to a survey by Bone and Joint Japan. 1st place, 2nd place, and 4th place in Japan in 2018, 2019, and 2020, respectively.

### Case 2: West Japan Works, JFE Steel Corporation (Kurashiki-City)

**Physical fitness test with unique indices sees use in preventing and ameliorating locomotive syndrome**

The seven-item test mimics tasks similar to those encountered at work, such as carrying objects



Daily workplace "Active Exercise®" videos are also available

To assess the physical capabilities necessary for safe workplace operations, JFE Steel Corporation's West Japan Works used the locomotive syndrome risk test to create the "Safe Physical Fitness® Functional Test," which it administers to all employees during routine health checkups. This test helps to facilitate continuous improvement follow-ups for people at risk of developing locomotive syndrome by visualizing disorders of the locomotor system and fall risks. It also serves as a benchmark that effectively supports swift recovery and recurrence prevention by objectively comparing the physical fitness data of employees looking to return to the workplace before and after an illness or injury.

In addition, two original exercises are performed once a day to help prevent falling accidents and disorders of the locomotor system. Practical initiatives have since taken hold, with the prevalence of falls and back pain decreasing every year. As a result, the test has been adopted even outside the company.