Summary of Evidence-based Guideline for **PATIENTS** and their **FAMILIES**

LIMB-GIRDLE AND DISTAL MUSCULAR DYSTROPHIES

This fact sheet is designed to help you understand the current evidence for diagnosing and managing limb-girdle muscular dystrophy (LGMD) and distal muscular dystrophy (distal MD).

The American Academy of Neurology (AAN) is the world's largest association of neurologists and neuroscience professionals. Neurologists are doctors who identify and treat diseases of the brain and nervous system, including neuromuscular disorders. The American Association of Neuromuscular & Electrodiagnostic Medicine (AANEM) is an association of neurologists, doctors of physical medicine and rehabilitation (PMR), and other health care professionals. PMR doctors specialize in rehabilitation. The AAN is dedicated to promoting the highest quality patient-centered neurologic care. The AANEM is dedicated to advancing the care of patients with muscle and nerve disorders.

Experts from the AAN and AANEM carefully reviewed the available scientific studies on diagnosing and managing LGMD and distal MD. The following information* is based on evidence from those studies. The information summarizes the main findings of the 2014 AAN and AANEM guideline on LGMD and distal MD.

To read the full 2014 guideline, visit *AAN.com/guidelines*.

What are LGMD and distal MD?

LGMD and distal MD are types of muscular dystrophy (MD). MD is a group of several different genetic diseases. It causes muscle "wasting" (thinning). This affects the muscles of the arms and legs. In some cases it may affect:

- Muscles of the face
- Muscles that control breathing and swallowing

The muscle weakness is progressive. This means the muscle damage gets worse and spreads over time to involve other muscles. Muscle weakness can make it difficult to move or to lift objects. It also affects posture, or the ability to hold the body upright.

LGMD

LGMD is a group of several known disorders, sometimes referred to as "subtypes." It gets its name from the muscles it affects most. "Limb girdle" refers to the hip and shoulder areas, where the limbs attach to the body. The affected muscles are also called "proximal" muscles. These are the muscles closest to the center of the body. The muscles farther away are called "distal." Examples of distal muscles are muscles of the hands and feet. Overall, LGMD mainly affects the muscles of the arms and legs. It can sometimes affect muscles that control facial movement and swallowing. However, some LGMD subtypes can cause heart problems. These include weakening of the heart muscle and abnormal heart rhythm. Some subtypes also can lead to breathing problems.

LGMD typically develops during childhood or early adulthood. However, babies, young children, and the elderly also can be affected. The severity of the disease differs across subtypes. Some subtypes are mild and mainly cause muscle pain. Others can lead to increasing weakness and loss of mobility. People who show symptoms of weakness at birth or as babies usually get worse faster and have worse symptoms. Early symptoms typically include:

- Muscle weakness in the hips and legs that causes the person to "waddle"
- Difficulty standing up, sitting down, or climbing stairs
- Trouble reaching overhead, stretching out the arms, and carrying heavy objects

Over time, more severe symptoms may develop in some subtypes. These include:

- Heart problems such as irregular heart rhythm
- Trouble breathing or swallowing

In addition, some subtypes of LGMD and distal MD may cause:

- Early onset of "foot drop" (inability to lift the foot up)
- Arms or legs that no longer straighten
- Muscle cramps
- Abnormally prominent shoulder blades (these are referred to as "winging")
- Enlarged calves (lower legs)

Distal MD

Distal MD is also a group of several different muscle disorders. It mainly affects the distal muscles. These include muscles of the hands, feet, lower arms, or lower legs. Over time, other muscles also are affected. In distal MD, symptoms begin during adolescence or adulthood. The disease progresses slowly over time. Symptoms vary by subtype but are similar to those for LGMD.

What causes LGMD and distal MD?

LGMD and distal MD are genetic disorders caused by changes or errors in a person's genes. Genes are part of the cells of the body. Everyone is born with a set of genes from both of their parents. The genes contain a program that tells the cells what to do.

Changes or errors in genes are known as "mutations." They interfere with the cells' ability to build proteins that help muscles develop or function. Different mutations affect different proteins. In LGMD and distal MD, the patient has one or more mutations in his or her genes that cause the disorder. Often, one or both parents pass the mutation down. However, sometimes it cannot be traced to either parent. In these cases, the mutation happens spontaneously in the person's genetic code. There are several known genes that cause these diseases. Each LGMD and distal MD subtype is caused by mutation of one of these genes. Researchers continue to discover mutations. Thus, new subtypes continue to be found.

How are LGMD and distal MD diagnosed?

LGMD and distal MD can be difficult to diagnose for these reasons:

- They are rare—most health care providers have little experience diagnosing and treating people with these diseases
- They can be confused with other muscle disorders—this may lead to the wrong diagnosis
- There are several subtypes that can look alike, affect similar muscle groups, and cause similar symptoms—thus, it may be difficult to tell one subtype from another
- Not all subtypes are known yet—patients may not be able to get a confirmed diagnosis

For an accurate diagnosis, it is important for doctors to obtain key information. This includes:

- Detailed knowledge of the person's symptoms, including where he or she has muscle weakness
- Details from personal and family health history
- Information from a complete physical exam, including:
  - Signs of heart problems
  - Signs of lung problems (trouble breathing)
- Results from blood tests for creatine kinase—an enzyme that leaks from damaged muscle and is found in high levels in people with these diseases
- In some cases, electromyography—this tests the electrical activity of muscles
- Findings from a muscle biopsy—a procedure that involves removing a piece of muscle tissue for study
- Genetic testing—a blood test to confirm a change or error in the gene that causes these diseases and their symptoms

Genetic Testing

Sometimes a person has an LGMD or distal MD diagnosis but does not know the subtype. Genetic testing can help confirm the diagnosis. The right genetic test can rule out other disorders. It also can help identify a specific subtype. There is moderate evidence* that specific information about the person can point to which test to use. This includes knowledge of family history and specific signs or symptoms. However, sometimes this information is not enough. Weak evidence* shows that, in these cases, genetic counseling or specialized genetic tests may help to diagnose the subtype. Genetic testing may be costly and sometimes is not available. Talk with your doctor about whether genetic testing is right for you.

Talk with your doctor for more information on genetic counseling and testing. An accurate diagnosis often requires:

- The right health information, including disease signs and symptoms
- The right genetic test for the person's situation

With an accurate diagnosis, unnecessary tests or treatments may be avoided. Knowing the specific subtype is important for getting the best possible care.

How are LGMD and distal MD treated and managed?

Currently, there is no cure for LGMD or distal MD. However, therapies are available to help with complications such as:

- Muscle symptoms (for example, weakness, pain, limbs that no longer straighten, problems with mobility)
- Heart problems (for example, heart beating too fast or skipping beats, shortness of breath)
- Lung/breathing problems
- Speech problems
- Pain or difficulty in swallowing
- Sleep problems

People with LGMD or distal MD should report any of these symptoms to their doctor or care team.

LGMD and distal MD complications require many types of care, including:

- Genetic counseling and testing
- Monitoring for and treatment of heart problems
- Monitoring for and treatment of breathing problems
- Speech and language therapy (for speech and swallowing problems)
- Nutritional support (for weight loss from swallowing problems)
- Orthopedic therapy or surgery (for muscle problems and bone weakness)
- Physical and occupational therapy, including gentle exercise
- Monitoring for symptoms of sleep problems
- Medical screening for possible infection (yearly flu shots)

These therapies involve many types of health care providers. Moderate evidence* shows that care should be coordinated through treatment centers specializing in MD.

For a summary of the main recommendations for management, see the table below.

More studies are needed to understand better:

- How many people these diseases may affect
- The connection between genes and signs/symptoms of subtypes
- How to manage serious complications such as heart and breathing problems

Recommendations for Clinicians to Manage Complications

Complication, Recommendation		Strength of Evidence*
Cardiac (Heart) Problems		
Symptom(s)/Diagnosis	**Recommendation**	
• New diagnosis of LGMD or distal MD • Specific genetic diagnosis of LGMD or distal MD	• Refer to heart specialist for cardiac (heart) evaluation, even if no symptoms	Moderate
• Abnormal ECG or structural heart evaluation • Episodes of fainting, near fainting, or heart beating fast	• Order heart rhythm evaluation (Holter monitor or event monitor)	
• Irregular heartbeat • Heart beating unusually fast • Signs or symptoms of heart failure	• Refer for cardiac (heart) evaluation	
Lung/Breathing Problems		
• Diagnosis of LGMD or distal MD, especially if breathing problems present	• Order evaluation or testing of lung/breathing function	Moderate
• High risk of lung or breathing failure	• Refer for evaluation or regular testing of lung/breathing function	
• Extreme daytime sleepiness • Poor quality of sleep • Breathing problems (not enough air coming in)	• Refer for lung/breathing or sleep evaluation for possible use of breathing machine	
Swallowing and Nutrition Problems		
• Trouble swallowing • Problems with foods or liquids going into the lungs by mistake • Weight loss	• Refer for evaluation of swallowing and digestion for: ▪ Techniques for safe and effective swallowing ▪ Possible placement of a swallowing tube (tube placed in the stomach and small intestine to help provide food and nutrients)	Moderate
Spinal Deformities and Weak Bones		
• Any diagnosis of LGMD or distal MD	• Monitor for development of spinal deformities (a spine that is not straight)	Moderate
• Spinal deformities	• Refer to an orthopedic back surgeon for monitoring and surgery, if needed	
• Limited or no mobility	• Test for weak or fragile bones	Weak

Infection Prevention		
• Any diagnosis of LGMD or distal MD	• Recommend pneumonia vaccine according to the CDC schedule[1] • Recommend yearly influenza (flu) vaccine	Moderate
Rehabilitation Management		
• Any diagnosis of LGMD or distal MD	• Refer to a clinic with access to multiple specialties designed for the care of people with diseases of the muscles and nerves • Recommend evaluation by a physical or occupational therapist as needed • Anticipate and facilitate patient and family decision-making related to advancement of disease and end-of-life care • Prescribe as needed: ▪ Physical and occupational therapy ▪ Tailored bracing and assistive devices (such as canes or wheelchairs)	Moderate
Strength Training and Exercise		
• Any diagnosis of LGMD or distal MD in people who exercise	• Educate about signs of muscle weakness and damage from overwork	Moderate
• Any diagnosis of LGMD or distal MD	• Educate about safety of aerobic exercise with supervised mild strength training program • Advise about the benefits of gentle, low-impact aerobic exercise • Counsel about staying hydrated and exercising moderately	Weak

CDC = Centers for Disease Control and Prevention; distal MD = distal muscular dystrophy; ECG = electrocardiogram; LGMD = limb-girdle muscular dystrophy

See complete guideline for complete set of recommendations. Some recommendations apply to specific subtypes or groups of subtypes.

The Jain Foundation and the Muscular Dystrophy Association (MDA) reviewed the content of this fact sheet. Some information on disease background was provided by the MDA at *MDAUSA.org*.

1. Bridges CB, Woods L, Coyne-Beasley T; Centers for Disease Control and Prevention ACIP Adult Immunization Work Group. Advisory Committee on Immunization Practices (ACIP) recommended immunization schedule for adults aged 19 years and older—United States, 2013. MMWR Surveill Summ 2013;62(Suppl 1):9–19.

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*After the experts review all of the published research studies, they describe the strength of the evidence supporting each recommendation:
Strong evidence = future studies very unlikely to change the conclusion
Moderate evidence = future studies unlikely to change the conclusion
Weak evidence = future studies likely to change the conclusion
Very weak evidence = future studies very likely to change the conclusion

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