Managing Your Angina Symptoms With Nitroglycerin

What About Exercise?

Rainer Hambrecht, MD, FESC; Kathy Berra, MSN, ANP; Karen J. Calfas, PhD

You have been diagnosed with angina pectoris, commonly referred to as angina. This condition may be associated with discomfort in the chest or adjacent areas. Other symptoms of angina may include shortness of breath, fatigue, or nausea. The symptoms you feel are usually the result of a temporary lack of blood flow to your heart muscle, often caused by a blockage in the blood vessels that feed your heart. It is especially noticeable when there is an increased demand on your heart to pump blood such as during exercise or periods of emotional stress.

There are 2 types of angina. If you have discomfort that usually arises on increased physical activity or stress, it is called stable angina. If your discomfort occurs with minimal activity or at rest or is increasing in frequency or intensity, it is called unstable angina. Angina is common in patients with coronary artery disease (CAD; blocked heart arteries usually caused by cholesterol and other risk factors such as high blood pressure, diabetes mellitus, and cigarette smoking) and occurs in both men and women across all age groups.

Generally, patients with chronic stable angina have reduced quality of life and are less likely to participate in regular physical activity programs. Nitroglycerin, also referred to as “nitro,” has been used with success for more than a century to treat angina. Nitroglycerin is a useful medication to help patients with CAD “reintroduce” physical activity into their lives. Nitroglycerin may alleviate the discomfort of both stable and unstable angina.

The Importance of Exercise for Patients With CAD

Most patients with CAD can reduce their risk of future heart problems if they make changes to their lives that help improve their health. One of the important lifestyle changes is participating in regular exercise. Research shows that routine exercise not only improves quality of life but also reduces the death rate in patients with CAD. The European Society of Cardiology, American Heart Association, American College of Cardiology, Preventive Cardiovascular Nurses Association, and American Association of Cardiovascular and Pulmonary Rehabilitation recommend 30 to 60 minutes of moderate intensity exercise 5 days a week, which can be broken down into 10-minute increments.

There are numerous barriers to performing regular exercise. Many patients cite their poor health as a reason to avoid exercise. Other reasons include lack of knowledge on how to exercise safely, inexperience in exercise programs, and limited knowledge about nitroglycerin use to help control angina that may occur during exercise. Some patients tend to avoid physical stress and activity for fear of causing an anginal attack. The use of nitroglycerin before you exercise, known as prophylaxis, can allow you to perform regular exercise for a longer duration without chest discomfort from angina. Working with your doctor to understand specific exercises that you can perform safely and using nitroglycerin before you exercise can reduce 2 important barriers to being more active.

Nitroglycerin and Exercise

The prophylactic use of nitroglycerin in patients with stable angina

From the Department of Cardiology and Angiology, Heart Center Bremen, Bremen, Germany (R.H.); Stanford Prevention Research Center, Stanford University School of Medicine, Stanford, CA (M.F.L.); and Joint Doctoral Program in Clinical Psychology, University of California, San Diego, and San Diego State University (K.J.C.).

The information contained in this Circulation Cardiology Patient Page is not a substitute for medical advice, and the American Heart Association recommends consultation with your doctor or healthcare professional.

Correspondence to Rainer Hambrecht, MD, FESC, Klinikum Links der Weser, Department of Cardiology and Angiology, Heart Center Bremen, Senator-Wellinng-Strasse 1, 28277 Bremen, Germany. E-mail hambrecht_family@gmx.de

(Circulation. 2013;127:e642-e645.)

© 2013 American Heart Association, Inc.

Circulation is available at http://circ.ahajournals.org

DOI: 10.1161/CIRCULATIONAHA.113.000821
Nitroglycerin has been shown to increase physical exercise tolerance. Sublingual nitroglycerin and nitroglycerin spray are recommended for immediate relief of angina and are included as Class I recommendations by the American College of Cardiology, American Heart Association, American College of Physicians, American Association for Thoracic Surgery, Preventive Cardiovascular Nurses Association, Society for Cardiovascular Angiography and Interventions, and Society of Thoracic Surgeons. You can take nitroglycerin not only at the beginning of anginal discomfort but also when you anticipate or expect an episode of angina. According to guidelines issued jointly by the American College of Cardiology and American Heart Association, if you have stable angina, taking nitroglycerin before you begin your exercise can help you increase your exercise capacity so that you can exercise for longer duration without discomfort. Nitroglycerin helps your blood vessels relax. If you have been diagnosed with CAD, exercise can improve the function of your endothelial cells (cells that line the blood vessels). This leads to better blood flow through your blood vessels and reduces the symptoms caused by angina (Figure).

If you have symptoms of angina, please discuss prophylactic use of nitroglycerin with your doctor. Nitroglycerin is a medication that can provide relief of your discomfort. Some patients have experienced side effects such as headache or lightheadedness from nitroglycerin. If your doctor recommends nitroglycerin for you, please discuss specific instructions on what to expect and how to manage potential side effects should they occur.

Nitroglycerin Has a Long History of Being Used Safely and Effectively
Nitroglycerin is known to be safe and effective; it has been available for use for a very long time. Nitroglycerin was discovered by Ascanio Sobrero in 1847 following work with Theophile-Jules Pelouze. It was first used to treat angina by William Murrell as early as 1876. In 1977, Ferid Murad discovered the mechanism by which nitric oxide works to dilate (open) the blood vessels that bring blood to and from the heart. For this research, he shared the 1998 Nobel Prize with Dr Robert F. Furchgott and Dr Louis J. Ignarro, who were both pioneers in this field.

How Is Nitroglycerin Supplied?
Nitroglycerin is available in several different forms. Of the forms described below, the spray and tablet are the most commonly prescribed. Your doctor will help you decide which one is right for you.

• Spray: Aim the spray on or under the tongue. To use the oral spray, remove the plastic cap, but do not shake the container. In case of a new bottle or container, prime the pump before use by releasing a test spray. Similarly, if a bottle has not been used for more than 6 weeks, prime it again with 1 or 2 test sprays. The spray has a shelf-life of 2 years.
• Tablets: Nitroglycerin tablets, which come in bottles, should be placed underneath the tongue (sublingual) or between teeth and cheek; they should not be chewed, crushed, or swallowed. The tablet acts rapidly (within 1–2 minutes). Nitroglycerin tablets are potent until the labeled expiration date is reached and should then be replaced. They should be stored in a closed container at room temperature and away from heat, moisture, and direct light. The sublingual tablets should be kept in the original bottle, and the cap should be screwed on tightly after each use.
• Capsules/pills: You can take these capsules/pills by mouth, similar to other pills. They are usually prescribed to be taken 2 to 4 times a day.
• Patch: The patch should be applied to the chest, back, shoulders, or upper arms but not on legs, lower arm, or any hairy area. The patch should be used for 12 hours on and 12 hours off so that you do not develop tolerance to it.
• Ointment: The ointment comes in a tube and should be smoothed lightly (not rubbed) on the skin. This form is generally used only in patients who are hospitalized.

If you have mild anginal symptoms with exercise, your doctor may advise you to use the spray or tablet either 5 or 10 minutes before you exercise or as soon as you feel your angina symptoms coming on. It is recommended that you use the fewest number of sprays or tablets needed to relieve the angina discomfort. Whichever form your doctor prescribes for you, it is important to remember to take nitroglycerin exactly as directed; do not discontinue the medication without your doctor’s consent. It is also a good idea to keep track of how many sprays or tablets you use each day or week so that you can determine if your angina is getting better or worse. If you need more nitroglycerin to do the same amount of exercise, you should let your doctor know. The Table shows the various grades of angina. Rating your angina on a scale of 1 (mild) to 4 (worst ever) helps you know when to take action.

Please read this next section carefully because you need to know when to call for help if your angina is not relieved within a certain prescribed period of time.

How Much Nitroglycerin Should I Take and What Do I Do if it Does Not Relieve my Anginal Discomfort?
Please take 1 dose of nitroglycerin (1–2 sprays or a tablet) immediately at the onset of an angina attack. If the symptoms get a little better after the first dose but do not go away completely, a second dose may be taken (as advised by your physician) 5 minutes later. You can even take a third dose 5 minutes after the second dose. It is important to note that you should not use more than 3 doses in a 15-minute period.
Emergency services should be summoned if any of the following occurs:

- Your symptoms do not improve substantially within 5 minutes or if they worsen after the first dose.
- Your symptoms do not continue to get better after the second dose.
- Your chest pain/discomfort does not go away completely 5 minutes after taking the third dose.
- You feel that you have taken more than the required dose. Symptoms of an overdose may include headache, confusion, dizziness, slow or pounding heartbeat, nausea, vomiting, fainting, shortness of breath, sweating, flushing, cold and clammy skin, loss of ability to move the body, loss of consciousness for a period of time, or seizures.

**Are There Any Situations in Which Patients Should Not Take Nitroglycerin?**

Nitroglycerin should be used only to treat angina pectoris. Please consult with your physician before starting your exercise program. The use of nitroglycerin in patients with angina at rest should be specifically prescribed by their physician. Nitroglycerin should not be taken if you have a known allergy to nitrates/nitrites. Additionally, you may develop tolerance with continuous use of nitrates. When nitroglycerin patches are used, intermittent therapy (12 hours on and 12 hours off) is advised. Phosphodiesterase-5 inhibitors (such as Viagra or Cialis used for the treatment of erectile dysfunction) taken along with nitroglycerin can lead to extreme relaxation of

---

**Table. Various Grades of Angina**

<table>
<thead>
<tr>
<th>Grade</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Mild (very little) angina that goes away when you slow down or rest.</td>
</tr>
<tr>
<td>2</td>
<td>A little worse than grade 1. The angina goes away quickly with rest and/or nitroglycerin.</td>
</tr>
<tr>
<td>3</td>
<td>Worse than grade 2. You may feel it in other parts of the body such as the neck, jaw, back, shoulders, or arms. You may also have shortness of breath. This angina needs rest and nitroglycerin to go away.</td>
</tr>
<tr>
<td>4</td>
<td>The worst angina you have ever had.</td>
</tr>
</tbody>
</table>
blood vessels and, in some patients, to very low blood pressure. Hence, nitroglycerin use in conjunction with these medications is strictly prohibited. Headache of varying severity has also been commonly reported with nitroglycerin. Please discuss headache caused by nitroglycerin with your physician.

The Good News
Participating in a physical activity program that you enjoy is an excellent way to help manage your CAD. The good news is that even a small increase in physical activity is likely to have a positive impact on your health, and regular exercise promotes longevity. For example, if you walk or garden for 15 minutes, consider increasing that to 20 minutes. If you sit most of the day, consider standing periodically to break up long periods of sitting. Talk to your doctor about the type and amount of physical activity you can do safely. If fear of angina is one of the reasons you avoid exercise, talk to your doctor about the possible use of nitroglycerin to prevent or lessen these symptoms. There are many health benefits to gain from adding more physical activity into your routine. Discuss this with your doctor at your next opportunity.

Acknowledgments
Medical writing services were provided by Cactus Communications. The authors retained full control of the article content.

Sources of Funding
Medical writing services were funded by Arbor Pharmaceuticals.

Disclosures
All authors received an honorarium from Arbor Pharmaceuticals for this article.
Managing Your Angina Symptoms With Nitroglycerin: What About Exercise?
Rainer Hambrecht, Kathy Berra and Karen J. Calfas

Circulation. 2013;127:e642-e645
doi: 10.1161/CIRCULATIONAHA.113.000821
Circulation is published by the American Heart Association, 7272 Greenville Avenue, Dallas, TX 75231
Copyright © 2013 American Heart Association, Inc. All rights reserved.
Print ISSN: 0009-7322. Online ISSN: 1524-4539

The online version of this article, along with updated information and services, is located on the
World Wide Web at:
http://circ.ahajournals.org/content/127/22/e642

Permissions: Requests for permissions to reproduce figures, tables, or portions of articles originally published
in Circulation can be obtained via RightsLink, a service of the Copyright Clearance Center, not the Editorial
Office. Once the online version of the published article for which permission is being requested is located,
click Request Permissions in the middle column of the Web page under Services. Further information about
this process is available in the Permissions and Rights Question and Answer document.

Reprints: Information about reprints can be found online at:
http://www.lww.com/reprints

Subscriptions: Information about subscribing to Circulation is online at:
http://circ.ahajournals.org//subscriptions/