

# Circulation

JOURNAL OF THE AMERICAN HEART ASSOCIATION

American Heart  
Association®   
*Learn and Live*™

## **Nitroglycerin: The "Mini" Wonder Drug**

Thomas B. Graboys and Bernard Lown

*Circulation* 2003;108:e78-e79

DOI: 10.1161/01.CIR.0000086629.67552.3A

Circulation is published by the American Heart Association, 7272 Greenville Avenue, Dallas, TX 75214  
Copyright © 2003 American Heart Association. 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/cgi/content/full/108/11/e78>

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

Permissions: Permissions & Rights Desk, Lippincott Williams & Wilkins, a division of Wolters  
Kluwer Health, 351 West Camden Street, Baltimore, MD 21202-2436. Phone: 410-528-4050. Fax:  
410-528-8550. E-mail:  
[journalpermissions@lww.com](mailto:journalpermissions@lww.com)

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



## Nitroglycerin

### The “Mini” Wonder Drug

Thomas B. Graboys, MD; Bernard Lown, MD



Newer drugs quickly replace older remedies. This has not been the case with nitroglycerin, now in continuous medical use for more than a century. Although other applications for it have been found in cardiology, nitroglycerin is the mainstay for affording rapid, indeed almost immediate, relief for angina pectoris. Patients who have mastered the proper use of this agent regard it as a “wonder drug.” At a time when the cost of pharmaceuticals is growing out of reach for many, nitroglycerin is still obtainable for pennies and remains one of the best buys in medicine.

#### What Is Angina and Why Take Nitroglycerin?

Relieving angina pectoris is the invariable indication for nitroglycerin. This unique discomfort located behind the breastbone is provoked by a temporary insufficiency of blood flow to heart muscle. Angina does not indicate a “heart attack,” nor is there ensuing heart muscle damage. The fact is that anginal discomfort is not caused by abrupt closure of a coronary artery, but rather results from a temporary mismatch between restricted blood flow in a preexisting obstructed coronary ar-

tery and an increased bodily demand for the heart to pump more blood. Nitroglycerin achieves its salutary action both by dilating coronary vessels and by decreasing the heart’s workload. The latter is accomplished by reducing peripheral return of blood to the heart, as well as by lessening the resistance to the outflow of blood from the heart into the main arterial circulation. The exact mechanism accounting for these effects remains unclear, though cumulating evidence points to the release of the powerful vasodilator substance nitric oxide from endothelial cells that line vessel walls, from smooth muscle embedded in vessels and perhaps even from platelets.

#### How to Use Nitroglycerin

Nitroglycerin, if taken properly, can help patients with angina achieve a pain-free and unrestricted lifestyle. Simple instructions at the very first encounter with a physician help encourage the free use of this drug. When a tablet is needed, it is placed under the tongue and allowed to dissolve. Generally, this takes about 20 to 30 seconds. Nitroglycerin can be chewed, but is less effective when swallowed without being dissolved. Positive drug action is hastened by sitting, leaning

forward, inhaling deeply, and bearing down as if for a bowel movement.

Nitroglycerin announces its action by a gentle tingling sensation under the tongue. Its vascular dilating action is not limited to the coronary arteries supplying blood to the heart. This is demonstrated by frequent facial flush, lightheadedness, or throbbing fullness or sensation of warmth in the head. Some patients complain of headache of varying severity. When the patient is assured that the mild untoward reactions are but part of the drug’s physiological repertoire, symptoms are generally minimized or totally obviated.

A good practice is to transfer a number of nitroglycerin tablets to a small pillbox and to make them readily available. Generally, nitroglycerin maintains its potency when secured in a tightly closed bottle for 3 to 4 months.

#### When Should Nitroglycerin Be Taken?

Nitroglycerin is more promptly effective when taken at the very inception of chest discomfort. It is even better to take a pill in anticipation of angina. Most patients having angina are aware of the factors that produce discomfort. The circumstances are generally exer-

From the Lown Cardiovascular Center, Brigham and Women’s Hospital, Boston, Mass.  
Correspondence to Thomas B. Graboys, MD, Lown Cardiovascular Center, 21 Longwood Ave, Brookline, MA 02446. E-mail tgraboy@partners.org or ckenney@partners.org  
(*Circulation*. 2003;108:e78-e79.)  
© 2003 American Heart Association, Inc.



tion, excitement, or deep emotion. Angina is most likely under the following conditions: When walking briskly outdoors on a cold, windy, or humid day; when hurrying with a heavy briefcase or bundles; when exerting after a heavy meal; when working under the pressure of a deadline; when speaking in public; when engaging in sexual activity; and when worried, tense, and especially when angry. Nitroglycerin taken to prevent attacks (prophylactically) under such circumstances is advisable.

After taking a nitroglycerin under the tongue (sublingually), relief is likely to follow within one to two minutes. Not all types of chest pain will respond to nitroglycerin. This proves helpful in differentiating symptoms caused by impaired blood flow in the coronary vessels or a diversity of noncardiac conditions. Nitroglycerin may interact with other cardiac medication, and this should be discussed with a physician.

### **Why Many Patients do Not Take Nitroglycerin**

A common practice is to hand the patient a prescription, with the sole instruction to put the pill under the tongue during chest discomfort. The doctor often alerts the patient that the use of nitroglycerin may be associated with lightheadedness or a throbbing headache. Patients so instructed infrequently resort to nitroglycerin. They generally reserve it for a more severe

episode of angina that does not immediately abate when they stop whatever they are doing.

Patients commonly harbor the superstitious notion that the less they resort to nitroglycerin, the less serious their affliction. Some fear addiction, habituation, or loss of nitrate efficacy at a time when they might really need it. Some are impeded in its use because of unease in exposing the fact that they suffer from a heart condition for fear of losing a job or arousing undue anxiety in a spouse. A common rationalization is that because the discomfort is transient, far preferable to taking a pill is to stop the exertion that provoked the angina in the first place. It is therefore important for the patient to understand that nitroglycerin is not habit-forming and is neither a narcotic nor a painkiller. It is permissible to take nitroglycerin numerous times during the course of the day without adverse consequences.

We encourage patients with newly diagnosed angina to take a sublingual nitroglycerin in our presence when they are not experiencing angina. While the drug is acting, explanation of its pharmacology and beneficent action proves valuable. These patients almost never have side effects and more readily resort to its use.

A few admonitions are in order. Viagra, used to treat erectile dysfunction, is not indicated for patients taking oral nitrates, nitroglycerin patches, or sublingual preparations. If one is experi-

encing angina that is not substantially relieved by nitroglycerin, or if the discomfort recurs after a single nitroglycerin pill, seeking the closest medical facility is an appropriate response.

### **Final Comments**

Fear and anxiety prevail among coronary heart disease patients. This is not at all surprising, as many are aware that sudden cardiac death or a disabling heart attack are possible outcomes of their condition. The occurrence of angina pectoris is therefore a disquieting reminder of one's uncertain hold on life. A wealth of published data documents psychological stress as an adverse prognostic factor for patients with coronary artery disease. Stress is invariably diminished by purposeful activity. Being able to terminate an anginal episode promptly, or better still to prevent its occurrence, puts one in control. Taking nitroglycerin is a self-empowering act. Being in control ameliorates fear and anxiety.

When nitroglycerin is properly and frequently used, it will improve the patient's quality of life. Patients experiencing angina can avoid costly interventions by being treated medically. Neither life's duration nor the patient's well-being is thereby compromised. Taking nitroglycerin freely, without anxiety, fosters self reliance—a highly desirable goal for all patients.

### **Acknowledgments**

This work was supported in part by the Lown Cardiovascular Research Foundation.