

# INTIMA-MEDIA THICKNESS (IMT) BACKGROUND



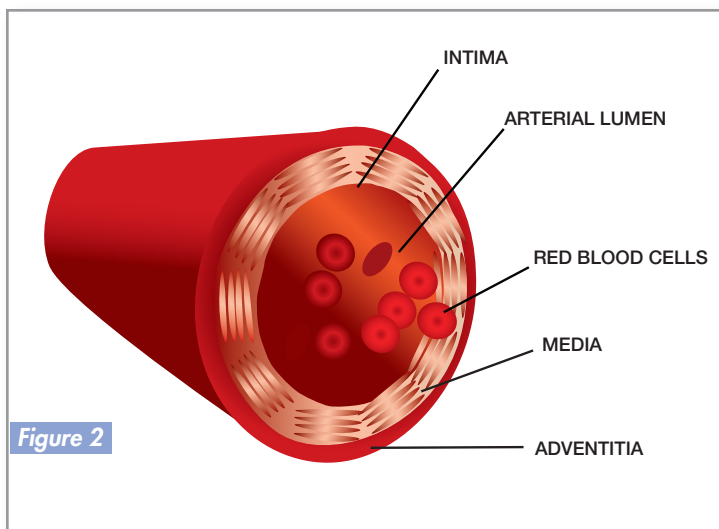
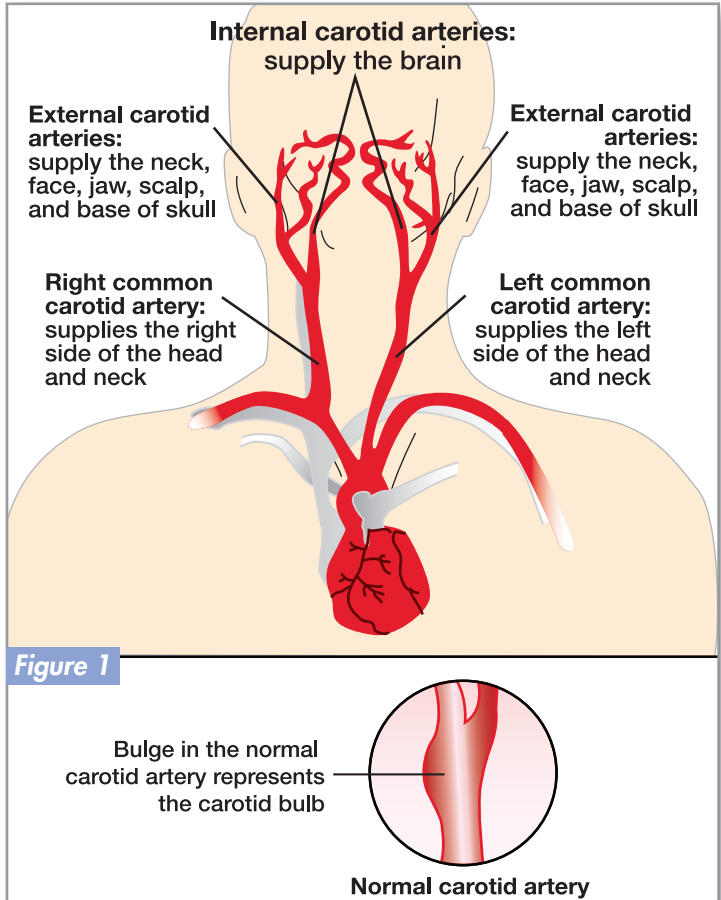
MERCK / Schering-Plough Pharmaceuticals

## Introduction

Ultrasound (ultrasonography) has become an important diagnostic technology in today's healthcare. These ultrasound procedures make it possible to visualize deep structures in the body. How does ultrasound work? Basically, ultrasonic waves are directed into the body tissues. The waves or echoes that bounce back from the tissues are recorded as an image. Below we will be discussing carotid artery ultrasound.

## What are Carotid Arteries?

Carotid arteries are located on either side of the head and neck region and are called the right carotid artery and the left carotid artery. On each side of the head, the common carotid artery branches into the internal carotid artery and external carotid artery. These arteries deliver oxygen-rich blood from the heart to the head and brain. The carotid bifurcation separates the common carotid artery into the internal and external carotid arteries.



## What is Carotid Intima-Media Thickness or IMT?

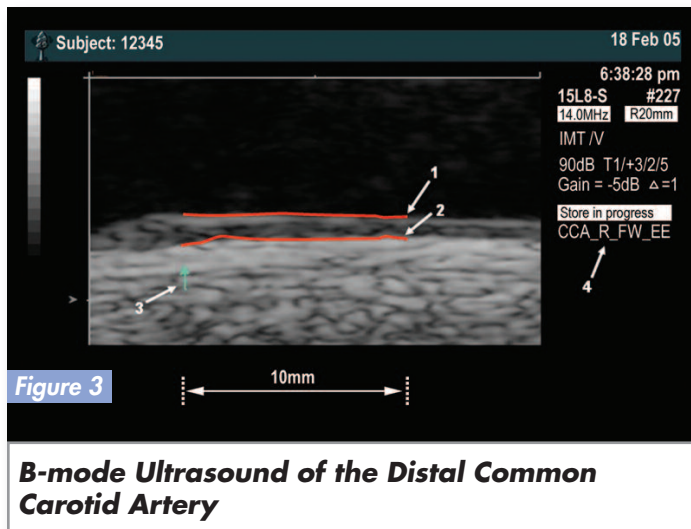
The artery typically has three layers: the intima (innermost layer, which is in contact with the blood stream), the media (middle layer), and the adventitia (outer layer). Intima-media thickness (IMT) refers to the measurement of the thickness of the two layers, intima and media, of the artery. In patients with atherosclerosis, these layers may thicken, reducing the size of the lumen and restricting blood flow. Intima-media thickness of the carotid artery is known as carotid IMT (see figure two).

## What is Carotid Ultrasound?

Carotid ultrasound is a non-invasive ultrasound technique in which the ultrasound probe is placed externally on the right and left side of the neck. Carotid ultrasound is used to measure the intima-media thickness of the carotid artery. Intima-media thickness can be measured at various sites of the carotid artery, including the common carotid artery (CCA), carotid bifurcation, and the internal carotid artery (ICA). Using carotid ultrasound, the properties of the vessel wall can be determined. Ultrasound imaging can visualize the arterial wall at different stages of atherosclerosis.

There are several types of ultrasound technology available to assess the carotid arteries. Brightness-mode (B-mode) ultrasound imaging technology provides a three-dimensional image of the carotid artery wall and the surrounding structures. It provides information on the type and extent of arterial damage, and allows non-invasive, real-time, high-resolution imaging.

The figure below shows a B-mode ultrasound of the distal common carotid artery. The red line designated as "1" is the edge of the intima which is in contact with the blood stream (the black space shown above the red line). The red line designated as "2" is the edge where the media and adventitia meet. The distance between lines 1 and 2 is the carotid intima-media thickness.



B-mode ultrasound image of the distal common carotid arterial wall of a healthy 24-year-old male. Intima-media thickness is 0.49 mm (SD 0.08 mm). In the arterial walls of healthy individuals, some thickening in areas of increased shear stress, such as the carotid bulb and internal carotid, is a common finding.

1) Lumen-intima interface. 2) Media-adventitia interface. 3) The green arrow indicates the region proximal to the dilation. 4) The information on the right of the figure indicates the study-specific application protocol and instrument settings.

Abbreviations: 'CC\_R\_FW\_EE', right common carotid far wall with the transducer, ear-to-ear position.