

Thomas G. Williams Ph.D.

Joel J. Pins Ph.D., MPH, L.N.

## MANAGING LIPOPROTEIN DYSLIPIDEMIAS THROUGH LIFESTYLE AND NUTRACEUTICAL THERAPIES

**F**or the past several decades, the primary blood marker associated with the risk for cardiovascular disease has been cholesterol. Initially it was total cholesterol, then later, LDL cholesterol and HDL cholesterol (deemed “bad” and “good”, respectively) became household terms. This review will attempt to demonstrate that these measurements alone tell only part of the overall cardiovascular risk story, and perhaps have only been surrogate markers for other, more causative, risk factors. We will discuss the anatomy of a lipoprotein particle and review the risk associated with each component (cholesterol, triglycerides, and proteins), as well as the number and size of the particles themselves. A review of the most studied non-pharmacological approaches will follow.

### Introduction

Assessing an individual's cardiovascular disease risk involves understanding both non-modifiable (age, gender, family history, genetics) and modifiable risk factors (smoking, obesity, sedentary lifestyle, hypertension, and a host of measurable blood markers). Determining which of the modifiable factors is most important in determining risk, and which modification patients will comply with, will best determine the therapies that will have the greatest impact on their health. The list of potential modifiable risk factors and therapies; however, is quite long and expanding. Emerging risk factors are discovered frequently and engender debates among researchers and clinicians concerning the appropriateness of measuring and treating patients based on these new risk factors. In the past several decades, risk factors such as high-sensitivity c-reactive protein (hsCRP) and homocysteine have fallen into this category.

Blood lipoprotein markers, on the other hand, have a long record of use as measurable and treatable markers in the management of cardiovascular disease risk. The discovery of cholesterol deposits within atherosclerotic plaques led to the routine association between cholesterol and atherosclerosis; an association which quickly transferred to the general population and marketers of foods low in cholesterol. Total cholesterol (TC)

alone; however, turns out to be a poor marker for cardiovascular disease risk and in most cases does not predict cardiovascular events in individuals (although lifetime CHD mortality can be correlated to TC in western populations).<sup>1</sup> Further sub-fractions of cholesterol measurements have since been used to improve cardiovascular risk assessment. Low density lipoprotein cholesterol (LDL-C) and high-density lipoprotein cholesterol (HDL-C) and the ratio between TC:HDL-C became a more common way of assessing CVD risk.<sup>2</sup> These, along with serum triglyceride (TG) measurements are still the most common lipid markers for measuring cardiovascular risk and also the primary focus of the National Cholesterol Education Panel (NCEP) guidelines for measuring and treating dyslipidemia. However, in order to fully understand and evaluate a patient's risk, as well as choosing the best laboratory markers for measuring risk, it is vital to understand the anatomy of the lipoprotein particles and how cholesterol, TG and apolipoprotein concentrations are determined.

### Understanding Lipoprotein Particles

Cholesterol and triglycerides are transported throughout the blood stream in particles called lipoproteins. Generally classified by their relative densities (very low-VLDL, low-LDL, intermediate-IDL, high-HDL), lipoproteins have a shell derived