

**Pathology 2015: Pathology scoring and aortic wall image analysis explore the role of Nicorandil & Atorvastatin in atherosclerosis: A histopathological experimental study - Reham Shehab - National Research Center, Egypt**

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**Context:** Digital pathology and image analysis have played a fundamental role in solving many diagnostic and prognostic dilemmas in pathology. In addition, it can provide the cornerstone of experimental research problems. In pharmacological studies, biochemical studies alone cannot provide a reliable conclusion; because the serum levels of different subjects do not necessarily reflect the final changes in tissue. Nicorandil, a nicotinamide ester and nitric oxide donor. Statins are the first choice for lowering cholesterol; both are believed to play an important role in the management of atherosclerosis.

**Objective:** The aim of the study was to provide pathological histological and numerical evidence on the real role of Nicorandil and atorvastatin in atherosclerosis. **Material and methods:** It was performed on atherosclerosis induced by a diet high in fat / cholesterol (HF / HCD) in rats. The animals were divided into groups: animals treated normally (having received a normal diet), atherosclerotic (model), atorvastatin and Nicorandil. A histopathological score and a digital measurement of the thickness of the aortic wall by image analysis were carried out as well as a complete biochemical lipid profile.

Atherosclerosis is a disease in which the interior of an artery narrows due to the buildup of plaque. Initially, there are usually no symptoms. When severe, it can lead to coronary artery disease, stroke, and peripheral artery disease or kidney problems, depending on the arteries affected. Symptoms, if they occur, usually do not start until middle age. The exact cause is not known. Risk factors include abnormal cholesterol levels, high blood pressure, diabetes, smoking, obesity, family history and unhealthy eating. Plaque is made up of fats, cholesterol, calcium and other substances found in the blood. The narrowing of the arteries limits the flow of oxygen-rich blood to certain parts of the body. The diagnosis is

based on a physical exam, an electrocardiogram and a physical exertion test, among others. Prevention usually involves eating a healthy diet, exercising, not smoking, and maintaining a normal weight. Treatment for an established disease may include cholesterol-lowering medications such as statins, high blood pressure medications, or medications that decrease clotting, such as aspirin. A number of procedures can also be performed such as percutaneous coronary intervention, bypass surgery, or carotid endarterectomy.

Atherosclerosis usually begins when a person is young and gets worse with age. Almost everyone is affected to some extent by the age of 65. It is the number one cause of death and disability in the developed world. Although it was first described in 1575, there is evidence that the disease occurred in people over 5,000 years ago.

**Signs and symptoms:**

Atherosclerosis has been asymptomatic for decades because the arteries widen at all locations on the plaque, so there is no effect on blood flow. Even most plaque ruptures do not produce symptoms until enough artery narrowing or closing, due to clots, occurs. Signs and symptoms only appear after a severe shrinkage or closure that prevents blood flow to different organs enough to cause symptoms. Most of the time, patients only become aware of the disease when they have other cardiovascular disorders such as a stroke or a heart attack. However, these symptoms always vary depending on the artery or organ affected. Typically, atherosclerosis begins in childhood, in the form of a thin layer of yellowish-white streaks with the inner layers of the artery walls (an accumulation of white blood cells, mainly monocytes / macrophages) and progresses to from there.

Clinically, given the widening of the arteries for decades, symptomatic atherosclerosis is generally

associated with men in their forties and women in their fifties and sixties. Subclinical, the disease begins to appear in childhood and is rarely already present at birth. Visible signs may start to develop at puberty. Although symptoms are rarely seen in children, early detection of children for cardiovascular disease could be beneficial for both the child and their loved ones. While coronary artery disease is more prevalent in men than in women, atherosclerosis of the cerebral arteries and strokes affect both sexes equally. A marked narrowing in the coronary arteries, which are responsible for the supply of oxygenated blood to the heart, can produce symptoms such as chest pain in angina and shortness of breath, sweating, nausea, dizziness or dizziness, shortness of breath, or palpitations. Another consequence of ischemia is abnormal heart rhythms called arrhythmias - the heart beating too slowly or too quickly.

The carotid arteries supply blood to the brain and the neck. Significant narrowing of the carotid arteries may present with symptoms such as feeling weak, inability to think straight, difficulty speaking, dizziness and difficulty walking or standing upright, blurred vision, numbness of the face, arms and legs. , severe headache and loss of consciousness. These symptoms are also linked to a stroke (death of brain cells). Stroke is caused by a marked narrowing or closing of the arteries going to the brain; the lack of adequate blood supply leads to the death of affected tissue cells. The peripheral arteries, which supply blood to the legs, arms and pelvis, also experience marked narrowing due to rupture of the plaque and clots. Symptoms of marked narrowing are numbness in the arms or legs, as well as pain. Another important place for plaque formation is the renal arteries, which supply blood to the kidneys. The occurrence and accumulation of plaques leads to decreased renal blood flow and chronic kidney disease, which, like all other regions, is generally asymptomatic until the advanced stages.

According to 2004 US data, in around 66% of men and 47% of women, the primary indication of atherosclerotic cardiovascular disease is a heart attack or sudden cardiac death (death within 1 hour of symptom onset). Cardiac stress tests, traditionally the most widely used non-invasive test method for blood

flow limitations, in general, only detect light narrowing by 75% or more, although some doctors claim that stress methods nuclear can detect as little as 50%.

The case studies included autopsies of American soldiers killed during the Second World War and the Korean War. A widely quoted report cited autopsies of 300 American soldiers killed in Korea. Although the average age of men was 22.1 years, 77.3 percent had "overwhelming evidence of coronary arteriosclerosis". Other studies of soldiers during the Vietnam War have shown similar results, although often worse than those of previous wars. Theories include high rates of smoking and (in the case of Vietnamese soldiers) the advent of processed foods after World War II.

Results: There was a significant improvement in the pathological score in the groups treated with nicorandil and atorvastatin compared to the model group. The median thickness of the aortic wall measured by the image analysis system showed a significant difference between the groups studied.

Biography: Reham Shehab El Nemr Esmail received his master's and doctorate degrees from the Faculty of Medicine at the University of Cairo. She works as a pathology researcher at the National Research Center of Egypt (CNR) and elected for her center of excellence. She has published numerous articles and participated in NRC research projects. She is also a pathology consultant in hospitals of the armed forces and hospitals of the Ministry of Health in Egypt.

Conclusion: Histopathological notation and digital pathology by image analysis have proven the biochemically suggested role of Nicorandil and atorvastatin in atherosclerosis.