Numerous systematic classifications of cardiomyopathies have been advanced through the years, designed for physicians and basic scientists, and based on different taxonomic criteria, including origin, anatomy, physiology, symptoms, therapy, diagnosis, and histopathology. However, an inevitable limitation of any classification, either etiologic or functional, is the considerable overlap encountered between different groups into which diseases have been categorized. In fact, from the functional viewpoint, some cardiomyopathies do not have always the same static phenotype, but may dynamically evolve, as a consequence of remodeling, from one category to another during their natural clinical course. Moreover, also etiologic classifications of cardiomyopathies are imperfect, given that diseases with similar genotype can have different phenotypes and pathogenetic pathways and vice versa. Therefore, although the objective is a classification that can be appreciated by all interested parties and disciplines, it is universally accepted that no past, present or future classification of cardiomyopathies is likely to satisfy the purposes of all users.

The advent of cardiac transplantation and the renewed interest on sudden cardiac death have arisen exciting opportunities in the clinico-pathologic study of cardiomyopathies, as to allow the discovery of new entities. The availability of sophisticated methods of investigation like molecular biology techniques, other than the traditional tools in morphology, opened extraordinary avenues in the understanding the causes, other than the substrates of cardiomyopathies. The major advances were achieved in the last twenty years and pathologists played a major role as to highlight their key position in producing new knowledge: the discovery of new cardiomyopathies (see for instance primary restrictive and arrhythmogenic right ventricular cardiomyopathies), the understanding of the etiopathogenesis and the updates of classification. In particular, the 2006 American Heart Association (AHA) definition and classification scheme recognizes the rapid evolution of molecular genetics in cardiology, as well as the introduction of several recently described diseases, and it is unique in that it incorporates ion channelopathies and conduction disorders as a primary cardiomyopathy.

The AHA expert consensus panel proposed this definition: “Cardiomyopathies are a heterogeneous group of diseases of the myocardium associated with mechanical and/or electrical dysfunction that usually (but not invariably) exhibit inappropriate ventricular hypertrophy or dilatation and are due to a variety of causes that frequently are genetic. Cardiomyopathies either are confined to the heart or are part of generalized systemic disorders, often leading to cardiovascular death or progressive heart failure-related disability”.

From this definition, it appears clear that the major difference from prior efforts (1980 and 1995 WHO Classifications) is the genomic and molecular orientation of this proposed cardiomyopathy classification. It is based upon the hypothesis that causative mutations in genes encoding proteins regulating the transport of ions (“channelopathies”) across the cell membrane are responsible for electrical dysfunction that triggers primary life-threatening ventricular tachyarrhythmias. They ultimately may evolve in a structural disease. However, the authors themselves admit that it is probably still premature and
inadvisable to formulate a classification that is entirely dependent on genomics. The molecular genetics of myocardial disease is not yet completely understood, and more complex genotype–phenotype relationships will continue to emerge for these diseases. For example, several sarcomeric gene mutations are now known to cause both dilated and hypertrophic cardiomyopathies. Furthermore, troponin I mutations have been found to underlie both hypertrophic and restrictive cardiomyopathy.

On the other hand, an important goal of the 2006 AHA document is that myocardial dysfunction, that is a direct consequence of other cardiovascular abnormalities such as valvular heart disease, systemic hypertension, congenital heart disease, and atherosclerotic coronary artery disease, have not been considered anymore as cardiomyopathies.

As far as classification is concerned, cardiomyopathies are now divided into 2 major groups, i.e. primary or secondary, based on predominant organ involvement.

*Primary cardiomyopathies* (further subdivided into genetic, nongenetic, and acquired) are those solely or predominantly confined to heart muscle (Fig.). *Secondary cardiomyopathies* present myocardial involvement as part of a large number and variety of generalized systemic (multiorgan) disorders. In the WHO 1980 and 1995 classifications, these systemic diseases associated with secondary forms of cardiomyopathies have been referred to as "specific cardiomyopathies" or "specific heart muscle diseases", respectively.

An update of the 1995 WHO/ISFC classification has also been proposed as a position statement of the ESC Working Group on Myocardial and Pericardial diseases in 2008. In the definition, it is clearly stated that cardiomyopathy is ‘a myocardial disorder in which heart muscle is structurally and functionally abnormal in the absence of coronary artery disease, hypertension, valvular disease, and congenital heart diseases’. While accepting and reinforcing the idea advanced by the AHA statement to divide cardiomyopathies into familial/genetic and non-familial/non-genetic, the traditional division of primary and secondary (specific) cardiomyopathies was abolished, probably with the erroneous belief that primary means idiopathic and secondary means of known aetiology. Moreover, the concept of pure electrical dysfunction was denied, thus ruling out ion channel and conduction system diseases from the umbrella of cardiomyopathies.

Basically, five types of cardiomyopathies are recognized according to the morphofunctional phenotype (hypertrophic, dilated, arrhythmogenic, restrictive, and unclassified), either familial or non-familial, whether or not the heart is the only target of the disease. This approach is certainly a simplification of a complex nosographic puzzle, but does not yet fully answer the question raised by emerging evidence. While removal of specific cardiomyopathies such as ischaemic, hypertensive, and valvular should be greeted with cheers, as the AHA document first did in 2006, it is not convincing at all why myocarditis should be grouped ‘tout court’ among dilated cardiomyopathies. Moreover, the AHA position statement abolished the so-called non-classified cardiomyopathies, whereas the ESC position statement still regards forms such as non-compaction and Tako Tsubo in search of a room. Finally, only cardiomyopathies with structural deformities were included, renewing the purely morphofunctional approach, without considering the problem of possible evolution of a disease phenotype into another during the natural history and leaving electrical disorders without a taxonomic location.

Although we are well aware of the complexity of disease phenotype in the setting of a nosographic framework, an agreement to update the 1995 WHO/ISFC classification is deemed necessary, with merging views of worldwide scientists, based upon the
breaking news coming from genomics and proteomics of molecular cardiovascular medicine.

Key Words:

Figure:

![Diagram of Primary Cardiomyopathies](image)

**Selected References:**


**Bullet Points:**

• Since 1980, date of the first WHO classification of cardiomyopathies, major advances have been achieved, such as the discovery of new cardiomyopathies (primary restrictive, arrhythmogenic right ventricular cardiomyopathies, non compacted myocardium, etc), the understanding of the etiopathogenesis mainly thanks to molecular biology and the updates of classification.

• Pathological myocardial dysfunctions that are a direct consequence of other cardiovascular abnormalities (i.e. valve disease, systemic hypertension, congenital heart disease, and coronary artery disease) should be ruled out from the classification of cardiomyopathies.

• The myocardium has both an electrical and a mechanical function. Thus, should primary myocardial electrical dysfunction without structural abnormalities be considered a cardiomyopathy?

• Some myocardial disorders (see non-compactied myocardium and Tako Tsubo) are still in search of a room; should we maintain a group of so-called non-classified cardiomyopathies?