Cardiomyopathies: a revolution in molecular medicine and cardiac imaging

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The cardiomyopathies are defined as: 'a myocardial disorder in which the heart is structurally and functionally abnormal, in the absence of coronary artery disease, hypertension and congenital heart disease sufficient to cause the myocardial abnormality.'¹ With the advent of molecular cardiology and cardiovascular imaging (including MRI and echocardiography) in the last decade, much insight has been gained into the different clinical presentations, its familial and genetic causes and pathophysiology in explaining left ventricular function and prognosis. This has been especially true for hypertrophic cardiomyopathy, but also for dilated cardiomyopathy (DCM) and RV cardiomyopathy.

The present issue of the Netherlands Heart Journal shows clear examples of the revolution in molecular medicine and imaging technology, which has contributed to a clinical understanding of the disease. The manuscript by van Rijsingen et al.² shows the presence of a double heterogenous mutation in a severe type of hypertrophic cardiomyopathy within a family. The authors conclude that even when a disease-carrying mutation is found, all family members should have cardiological screening parallel to extended genetic screening. The authors also suggest to determine other mutations responsible for other types of cardiomyopathies. Although this last conclusion seems reasonable, nowadays mutation screening should be based on the phenotypic appearance as the authors suggest where NT-Pro BNP may serve as a diagnostic tool. In other words, if a DCM is present it can be useful to screen other genes. I completely agree with this last conclusion because Hoedemaekers et al.³ have shown similar findings in a family with noncompaction cardiomyopathy where also two mutations were shown

to be present in some family members, also with a severe disease experience.

Thus with the possibility to determine sarcomere mutation in families with hypertrophic cardiomyopathy it is recommended to determine all the genes that can potentially cause hypertrophic cardiomyopathy even when a pathological mutation is already known in the family.

With the possibility of genetic screening in families it is anticipated that a knowledge gap can be present for daily cardiological practice. This is illustrated by the study by Vehmeyer et al.⁴ who show that Dutch cardiologists have a knowledge gap in the understanding of hypertrophic cardiomyopathy carriers without manifest disease, the so-called phenotype normal (or almost normal) and genotype positive. Training of cardiologists and cardiologists in training is necessary. Currently, the Netherlands Institute for Continuing Cardiovascular Education, the CVOI, is already offering a training course in genetics for fellows in training.

Although the authors have studied the Dutch cardiologists for the care of mutation carriers, this editorial will also focus on the care by the clinical geneticist who is probably also ignorant about the actual consequences of screening families for sarcomere mutations and the presence of a normal phenotype. As is concluded for the cardiologists in genetics, the same may be true for clinical geneticists in cardiology where training about the presence of different phenotypes is of utmost importance to prevent unnecessary psychological and emotional disturbances in apparently healthy phenotypic normal individuals. One has to realise that for the general hypertrophic cardiomyopathy population the prognosis is good (1% mortality/per year) and it is not to be expected that screening family members with positive sarcomere mutations and normal phenotype will help to improve this already good prognosis. This has been described by Michels et al.⁵.

The other three reports are all related to imaging and different pathophysiological appearances of cardiomyopathy.

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The study by Tio et al.⁶ shows that ischaemia is present in patients with idiopathic cardiomyopathy together with decreased contractive muscular reserve. This phenomenon has been studied by both PET and MRI. This study is an example of the usefulness of imaging techniques to understand pathophysiology in cardiomyopathy. Also Soliman et al.⁷ showed the presence of ischaemia by adenosine stress both by contrast echo and PET in hypertrophic cardiomyopathy patients. Another example not mentioned in this issue is the well-known presence of fibrosis on MRI in hypertrophic cardiomyopathy patients showing as delayed enhancement and also having a prognostic value for sudden death.⁸ The imaging possibilities of MRI in the diagnosis of myocarditis are shown by Olimulder.⁹ The clinical diagnosis of myocarditis is a difficult one and often missed. These authors discuss the role of MRI (or CMR) in the evaluation of myocarditis-induced inflammatory cardiomyopathy. MRI (CMR) is essential for the diagnosis and follow-up of patients suspected for myocarditis and eventually cardiomyopathy. The remaining three manuscripts show the usefulness of imaging technology in cardiomyopathy. Kohmen¹⁰ discussed the findings of takotsubo cardiomyopathy in an 83-year-old female after pacemaker implantation. Ionescu¹¹ shows massive vascular and myocardial calcification by echocardiography. Xia et al.¹² show the presence of left ventricular aneurysms in dilated cardiomyopathy. These three clinical case studies show the importance of imaging both for diagnosis and understanding of pathophysiology.

In conclusion the studies discussed above are nice examples of the current state of the art in cardiology in the understanding of the cardiomyopathies, as shown by molecular cardiology and imaging findings. ■

References

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Announcement

From January 2010, the Netherlands Heart Journal (NHJ) will start with a new e-learning formula. In every NHJ edition (except the July/August edition) a special e-learning article will be published, recognisable by a special icon. Consequently, over a period of one year, ten e-learning articles will appear in ten subsequent NHJ editions. For each article ten questions will be prepared by the authors of the article. The reader can respond to these online questions, which are available through the website of our Cardiovascular Educational Institute (CVOI): www.cvoi.nl.

When you answer six out of the ten questions correctly, 1 accreditation point is granted by the Quality Committee of our Netherlands Society of Cardiology (NVVC). On an annual basis, 10 accreditation points can be collected, which are credited in the GAIA system. Detailed instructions will be provided in the NHJ issue of January 2010 together with the first e-learning article.

We hope that all readers of the NHJ will actively take part in this new, instructive and stimulating way of e-learning.