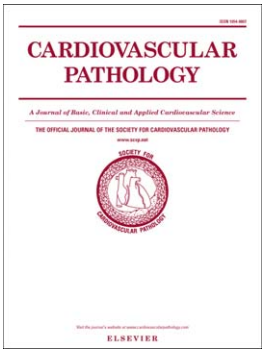


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PII: S1054-8807(15)00116-7
DOI: doi: 10.1016/j.carpath.2015.09.005
Reference: CVP 6875

To appear in: *Cardiovascular Pathology*

Received date: 13 July 2015
Revised date: 1 September 2015
Accepted date: 20 September 2015

Please cite this article as: Wassilew K, Terziev D, Wassilew G, Fitzl G, Frölich K, Kandolf R, Fried A, Ultrastructural-morphometric findings of cardiomyocytes in patients with impaired ventricular function- a comparative clinicopathological study, *Cardiovascular Pathology* (2015), doi: 10.1016/j.carpath.2015.09.005

# Ultrastructural-morphometric findings of cardiomyocytes in patients with impaired ventricular function- a comparative clinicopathological study

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## Abstract

Aim

The present study aims to analyze the differences in ultrastructural changes between right ventricular myocardium in clinically determined grades of heart failure [HF (NYHA class I-IV)] and their value in the routine diagnostic setting.

Methods

We investigated consecutive right ventricular endomyocardial biopsies of 12 patients presenting with HF (49±11.2 years; male=10) by light microscopy and ultrastructural morphometric analysis. The patients were divided into four groups according to their NYHA classes (NYHA I: n=1, II: n=2, III: n=8, IV: n=1). We used a stereological point counting method on electron micrographs to determine the volume, surface and numerical density of cardiomyocyte myofibrils, z-lines, mitochondria and cristae as required. Further, secondary parameters were calculated.

Results

Myofibrillar parameters increased between NYHA class I and II ($p<0.01$), which matched with more pronounced cardiomyocyte hypertrophy on the light microscopic level. In NYHA class III and IV, the myofibrillar parameters dropped, whilst parameters concerning the mitochondria and their cristae rose ($p<0.01$). This resulted in an elevated mitochondria to myofibril ratio ($p<0.05$) and correlated with histologically evident atrophic cardiomyocytes, perinuclear loss of myofibrils and dot-like PAS-positive perinuclear staining.

Conclusion

In this present study, right ventricular myocardial ultrastructure differed between patients diagnosed with HF of different degrees in distinct subcellular changes. These findings suggest that ultrastructural analysis, whilst correlated with histopathological features, adds to the diagnosis in the routine diagnostic setting, specifically in lower NYHA grades, in which only minor changes are observed histologically.

## Keywords

Heart failure; Electron microscopy; Stereology