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Novel Cardio-Specific Gene Therapy Strategies for Heart Failure

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Junior Clinician Scientist
nTTP-GCT-Cohort 2026

Department of Cardiology, Angiology and Pneumology
UNIVERSITÄTSKLINIKUM HEIDELBERG

Fields of Research:

- Heart failure
- Molecular cardiology
- Cardiac kinase networks
- Gene therapy
- Digital cardiology

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Translational Scientist
nTTP-GCT-Cohort 2026

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Fields of Research:

- Translational cardiology
- Molecular cardiology
- Gene therapy
- Cardiac metabolism

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Project Description:

Chronic heart failure remains one of the leading causes of morbidity and mortality worldwide despite major therapeutic advances. Key pathophysiological mechanisms include impaired autophagy and dysregulation of cardiomyocyte calcium handling. The aim of this translational project is to develop novel gene-based therapeutic strategies that specifically target these disease-relevant processes in the myocardium.

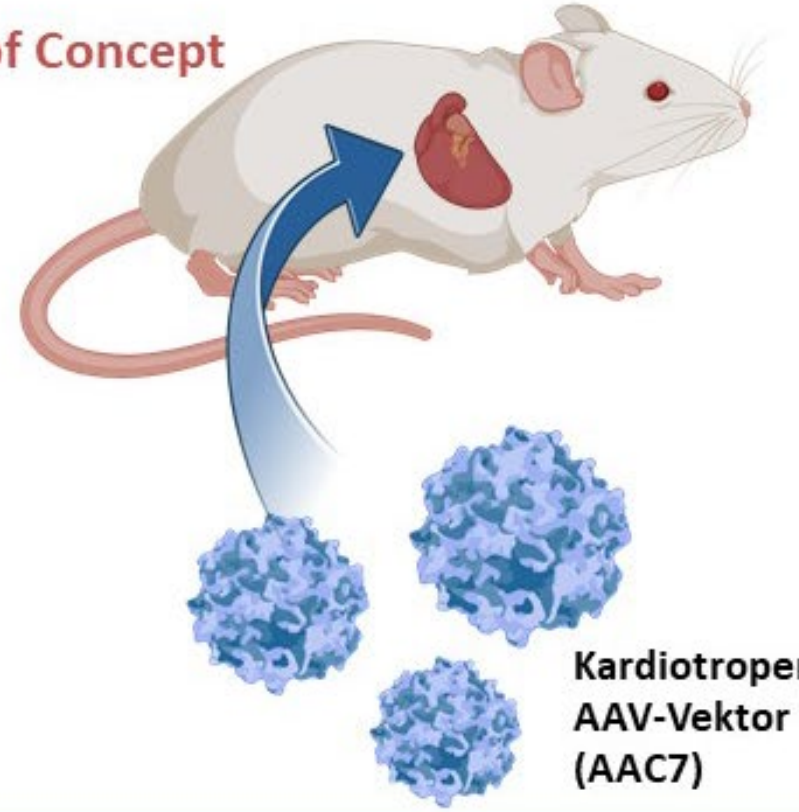
Two therapeutic targets are investigated: the autophagy regulator FYCO1 and the calcium channel-stabilizing factor FAM40b/Myoscape. Both genes are delivered by gene addition using a newly developed cardiomyocyte-specific adeno-associated virus vector (AAVC7) and evaluated in preclinical models of chronic heart failure. The vector is characterized by high cardiac transduction efficiency following systemic administration while showing minimal extra-cardiac expression.

Efficacy, dose response relationships, biodistribution, immunogenicity, and safety of the gene therapies are systematically assessed in mouse models of pressure overload induced heart failure. In addition, a scalable affinity-based AAV purification technology is employed, achieving a level of vector purity close to that required for clinical applications and thereby strengthening the translational relevance of the approach.

Overall, the project follows a rigorous translational strategy aimed at evaluating biologically rational gene therapy concepts for the treatment of chronic heart failure and at establishing a solid foundation for further development toward clinical application.

GCT
National Strategy
Gene- and Cell-Based Therapies
Promotion of Translational Talents

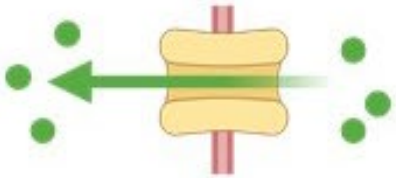
Proof of Concept



Kardiotroper AAV-Vektor (AAC7)

Molekulare Mechanismen

Kalziumzyklus: Myoscape



Autophagie: FYCO1