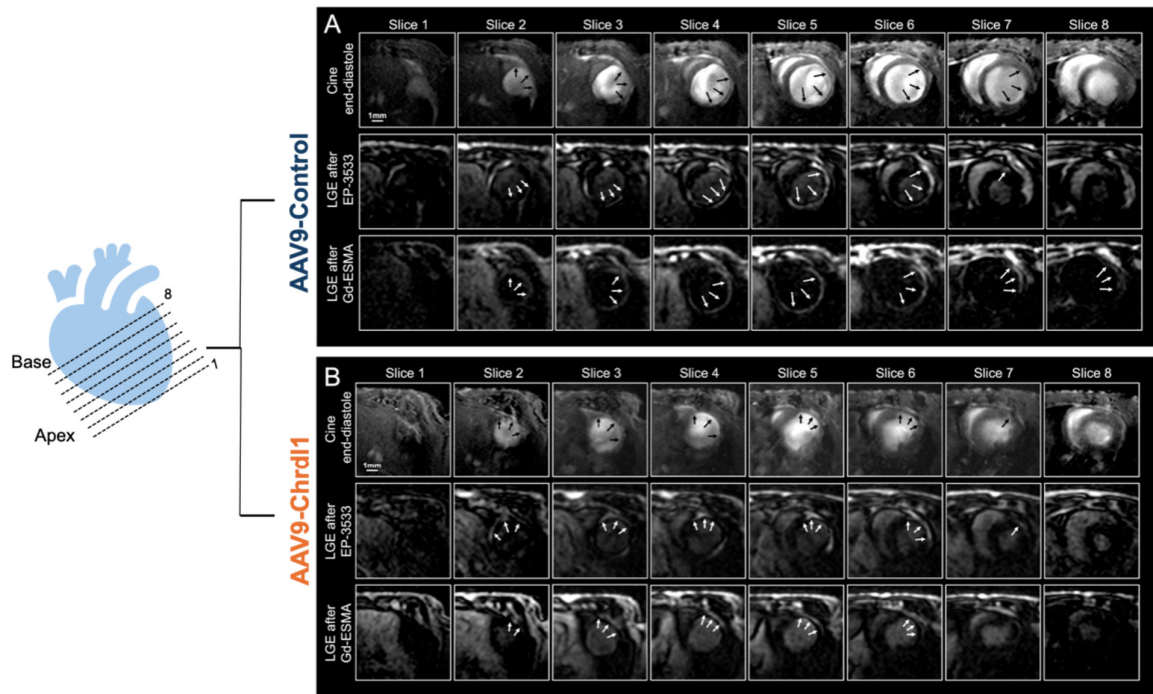


1 **Supplementary data online**

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5 **Figure S1. Whole-heart anatomical and molecular MRI at 4 weeks after MI in mice**

6 **receiving intramyocardial treatment with Chordin-like 1. (A)** Anatomical images

7 acquired at end-diastole and molecular MRI images detect left ventricular dilation,

8 myocardial thinning and deposition of COL1 (using the EP-3533 probe) and elastin

9 (using the Gd-ESMA probe) in the scar in mice receiving AAV9-Control treatment. **(B)**

10 Corresponding images in mice treated with AAV9-Chrdl1 show less cardiac dilation

11 and cardiac fibrosis. Slices extent from apex to base. N = 8 per group.

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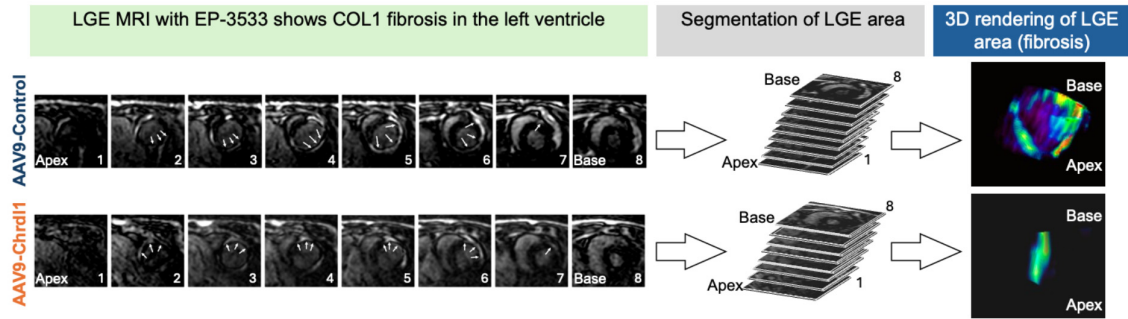


Figure S2. Volumetric analysis of cardiac fibrosis. Examples of short-axis late gadolinium enhancement images (LGE) after administration of the imaging probe EP-3533 that binds to COL1. The images extend from apex to base. The signal enhanced area was traced in each slice. A 3D reconstruction of the segmented area of COL1 deposition provides the total volume of collagen fibrosis in the heart and a visual representation of the distribution of collagen in the left ventricle. Treatment with AAV9-Chrdl1 vectors decreased collagen fibrosis. N = 8 per group.

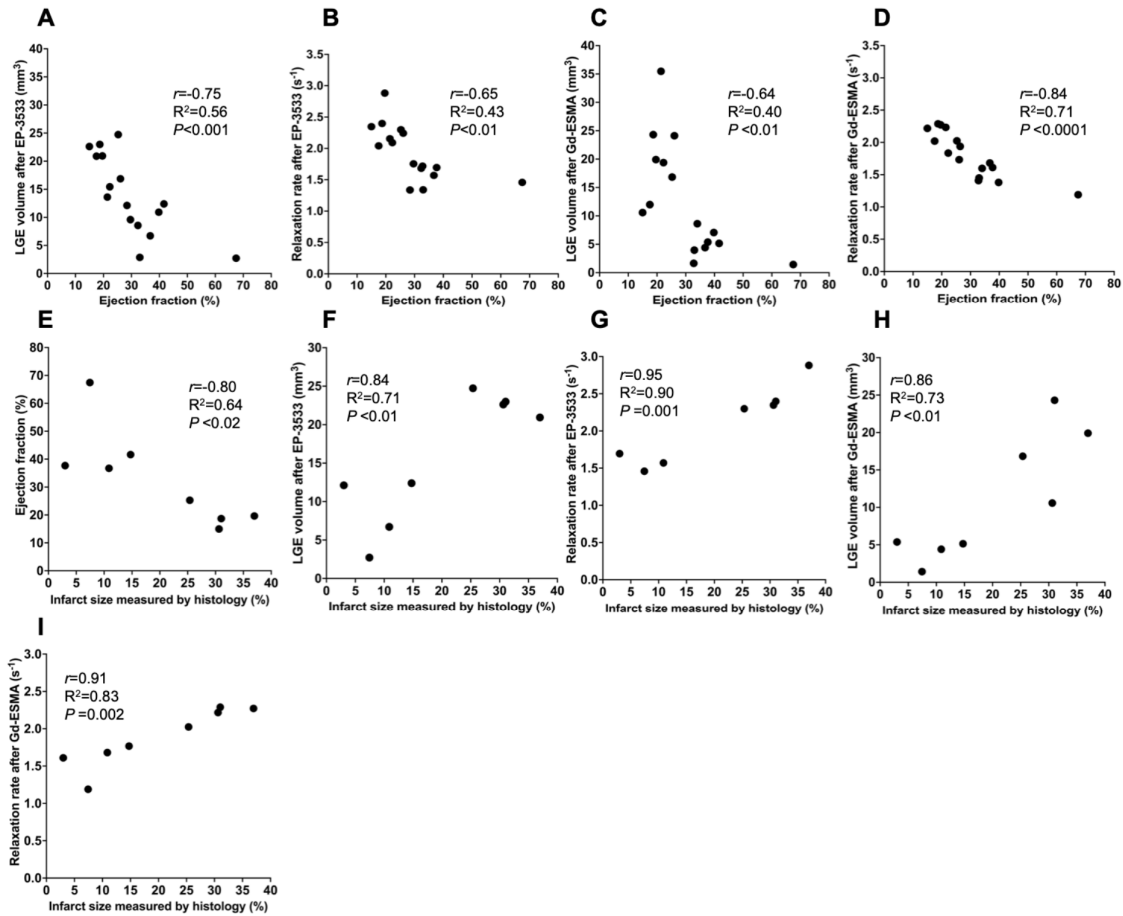


Figure S3. Correlation analyses between *in vivo* MRI data and *ex vivo* histology.

(A-D) Improved ejection fraction correlates with reduced cardiac fibrosis as measured by MRI. (E) Improved ejection fraction correlates with reduced infarct size measured by histology. (F-I) *In vivo* biomarkers of cardiac fibrosis (LGE volume and R1 relaxation of the infarct) correlate with histological assessment of infarct size. Correlations analysis was performed using the Pearson test. N = 16 for MRI data and N = 8 for histology.

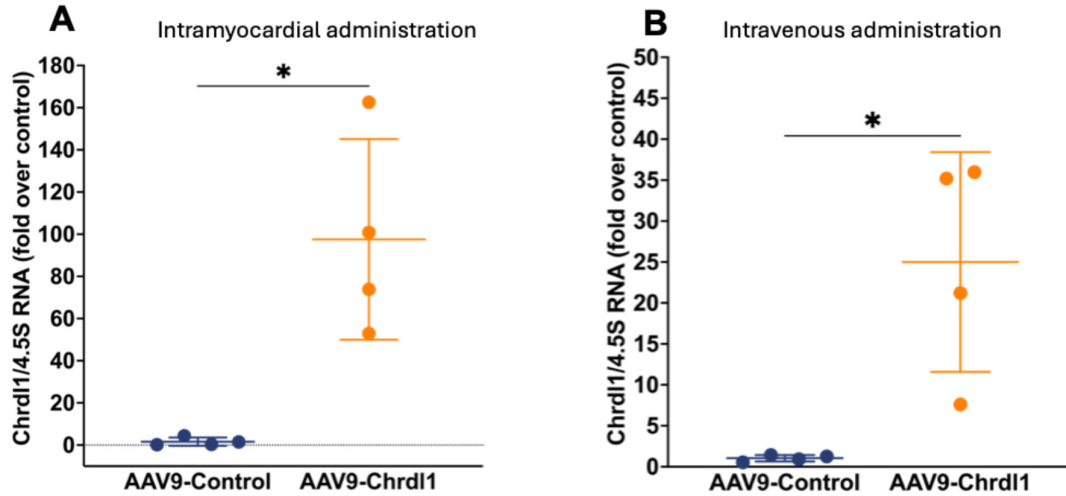


Fig S4. Transgene expression of AAV9-Chrdl1 by qPCR. After 4 weeks of intramyocardial AAV9-Chrdl1 injection and after 3 weeks of intravenous injection of AAV9-Chrdl1 the transduction of the myocardium was efficient and transgene expression of Chrdl1 long-lasting. Data is mean \pm S.D, * $P < 0.05$, Mann-Whitney U test. N = 4 per group.