

Supplementary Information

Range Variability in CMR Feature Tracking Multilayer Strain across Different Stages of Heart Failure

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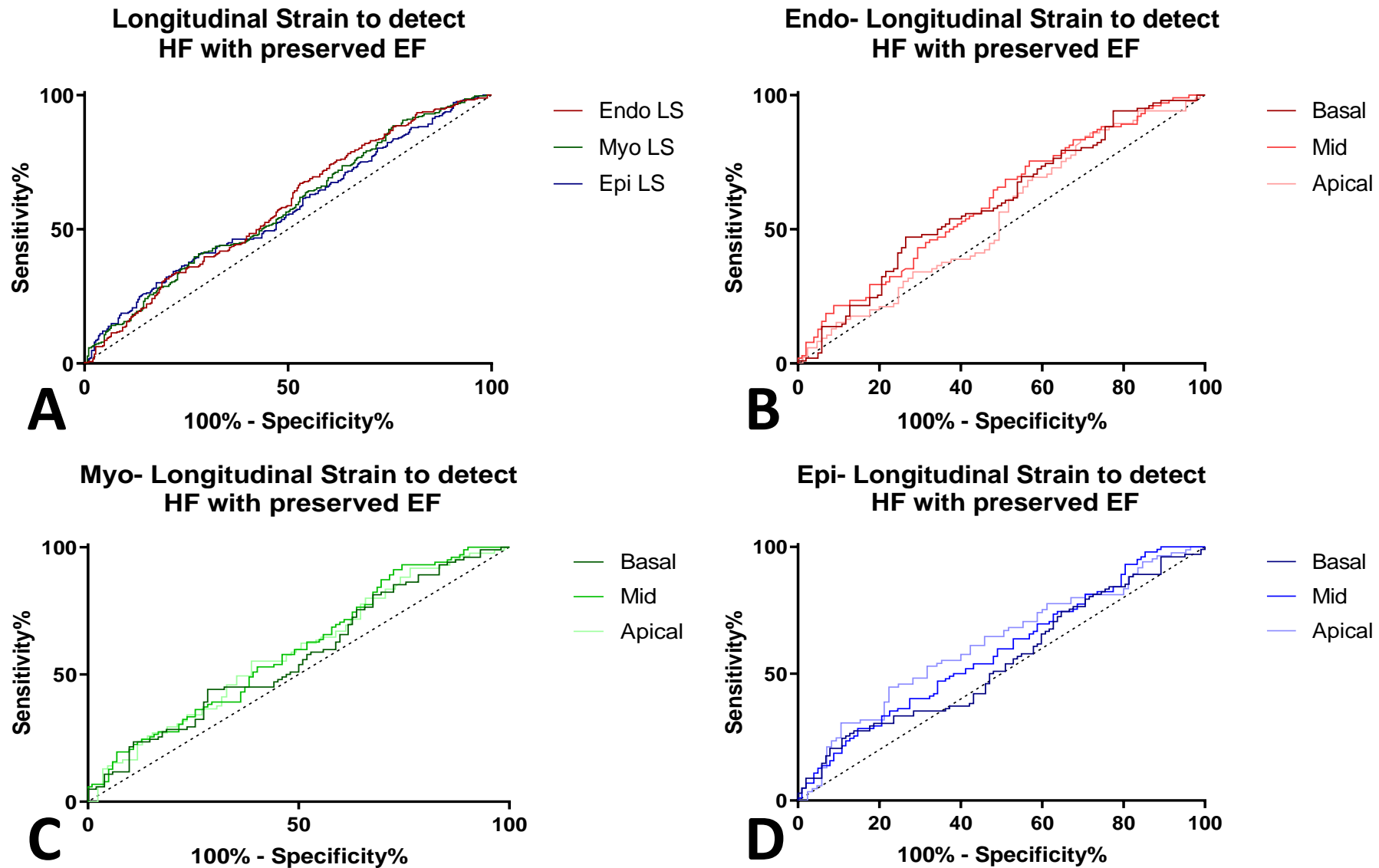
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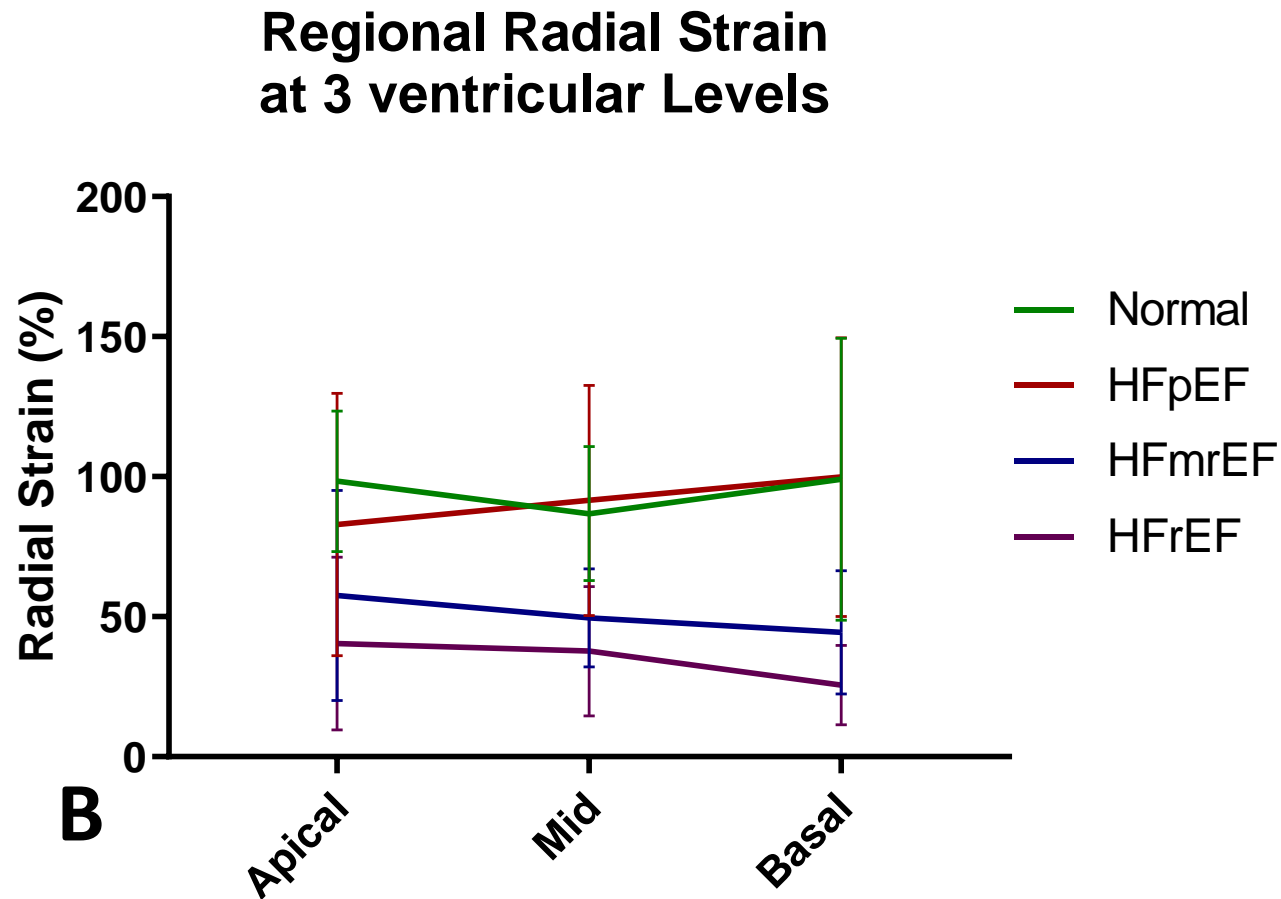
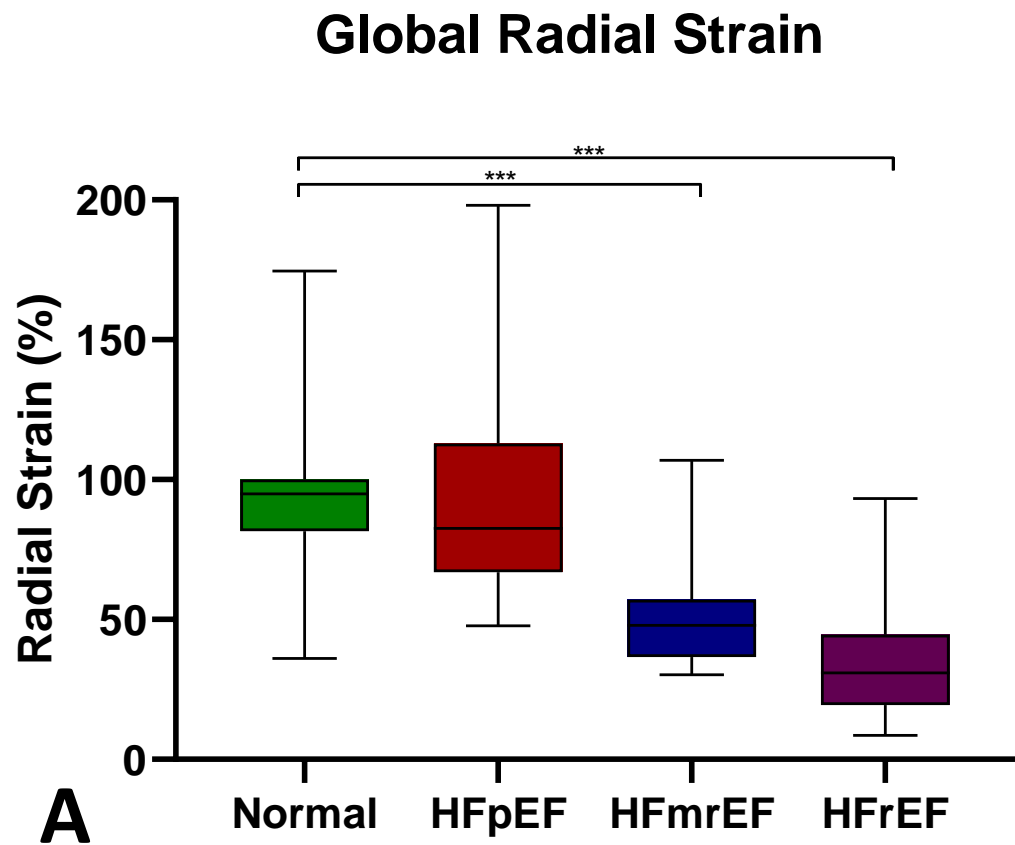
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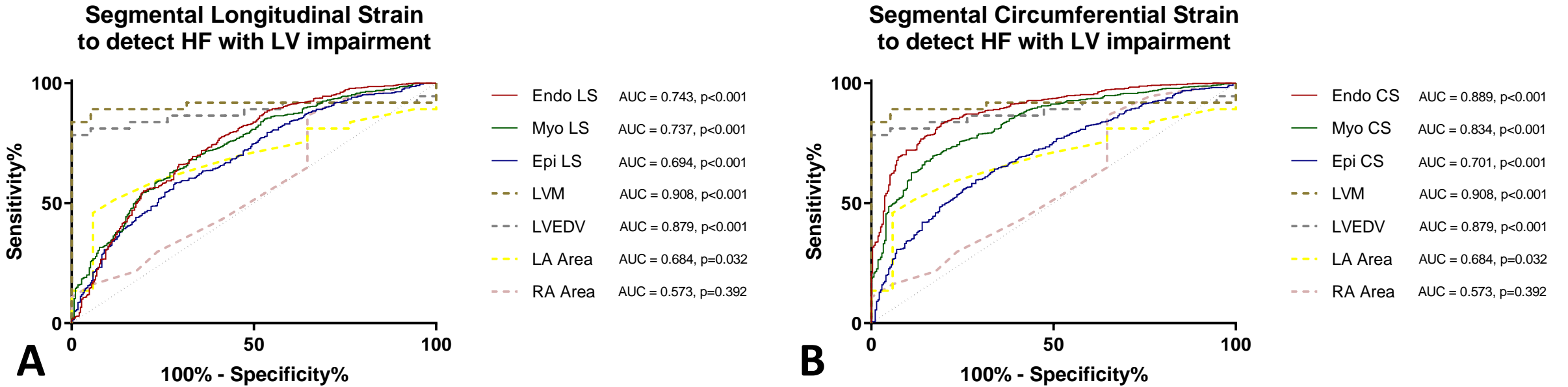
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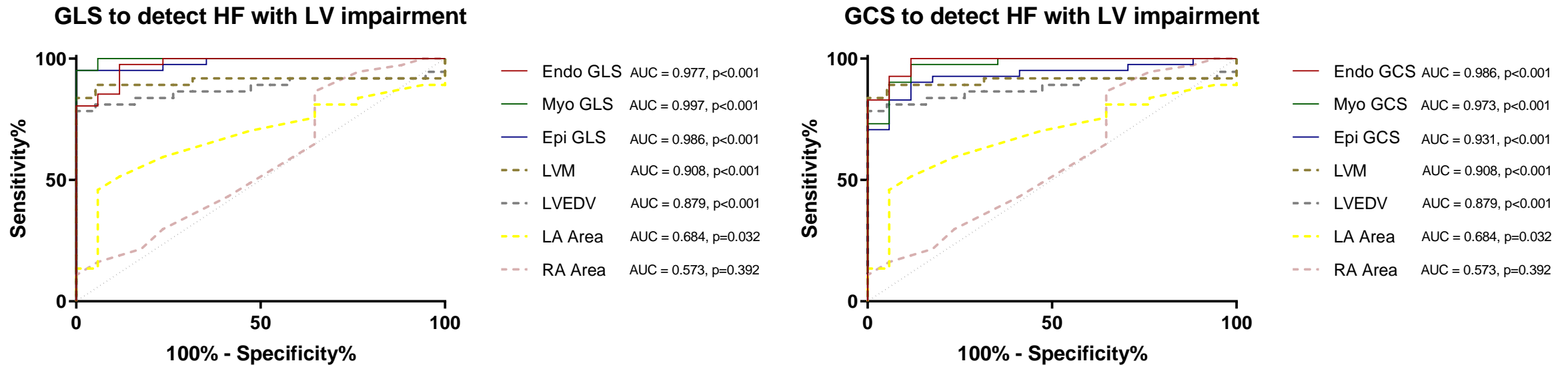
Supplement Figure 1. ROC analysis to discriminate patients with HF with preserved EF from Normal Subjects with multilayer longitudinal strain A) global segmental values, and B) regional basal segmental values, C) regional mid-ventricular segmental values, D) regional apical segmental values. (Endo LS – sub-endocardial longitudinal strain, Myo LS – mid-myocardial longitudinal strain, Epi LS, sub-epicardial longitudinal strain.



Supplement Figure 2. Monolayer assessment of A) Global and B) Regional Radial Strain. **Normal** – normal age-, gender- matched control, **HFpEF** – patients with HF with preserved EF, **HFmrEF** – patients with HF with mid-range reduced EF, **HFrfEF** – patients with HF with reduced EF.

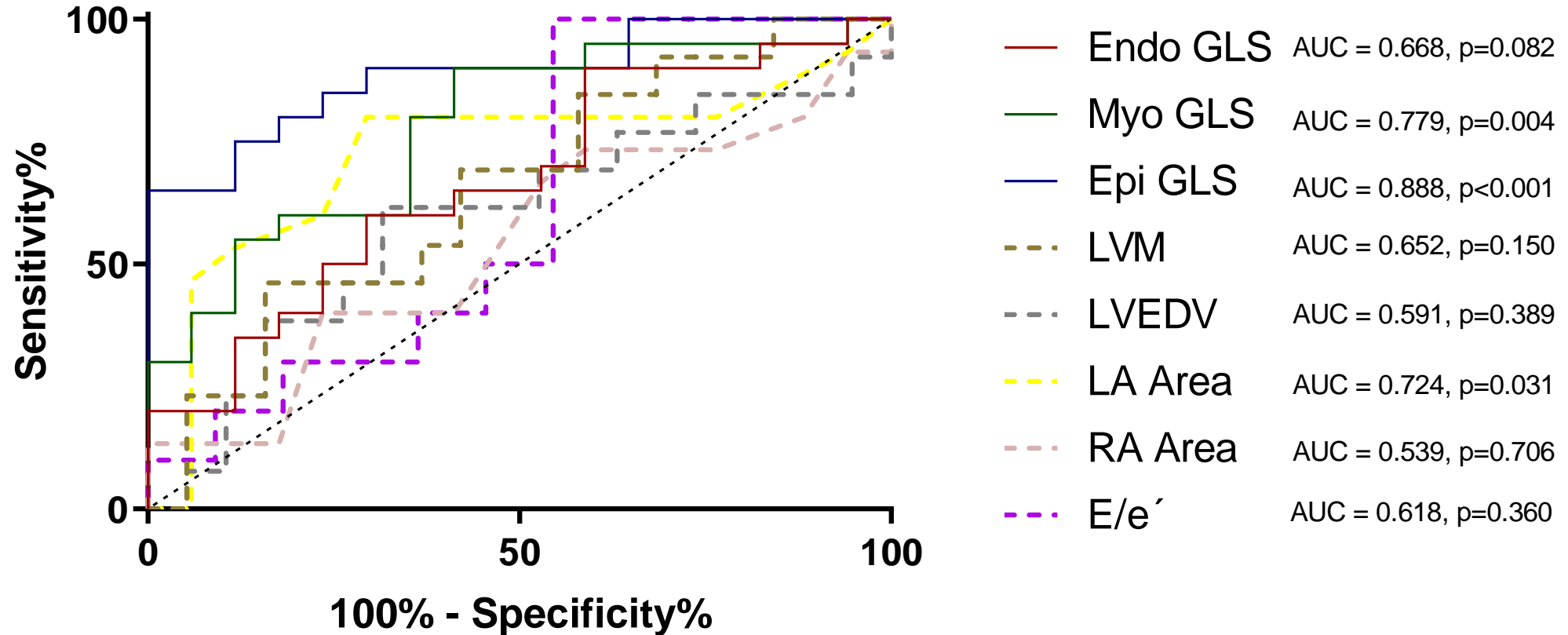


Supplement Figure 3. ROC analysis to discriminate patients with HF with LV impairment from Normal Subjects of multilayer A) Longitudinal Strain, and B) Circumferential Strain (Endo LS – sub-endocardial longitudinal strain, Myo LS – mid-myocardial longitudinal strain, Epi LS, sub-epicardial longitudinal strain, Endo CS – sub-endocardial circumferential strain, Myo CS – mid-myocardial circumferential strain, Epi CS, sub-epicardial circumferential strain). Dotted lines represent respectively LVM – indexed left ventricular mass, LVEDV – indexed LV end-diastolic volume, LA and RA area – indexed left atrial and right atrial areas.



Supplement Figure 4. ROC analysis to discriminate patients with HF with LV impairment from Normal Subjects of multilayer A) GLS, and B) GCS(Endo GLS – sub-endocardial longitudinal strain, Myo GLS – mid-myocardial longitudinal strain, Epi GLS, sub-epicardial longitudinal strain, Endo GCS – sub-endocardial circumferential strain, Myo GCS – mid-myocardial circumferential strain, Epi GCS, sub-epicardial circumferential strain). Dotted lines represent respectively LVM – indexed left ventricular mass, LVEDV – indexed LV end-diastolic volume, LA and RA area – indexed left atrial and right atrial areas.

GLS to detect HFpEF



Supplement Figure 5. ROC analysis to discriminate patients with HF with preserved EF from Normal Subjects of multilayer A) Endo GLS – sub-endocardial longitudinal strain, Myo GLS – mid-myocardial longitudinal strain, Epi GLS, sub-epicardial longitudinal strain. Dotted lines represent respectively LVM – indexed left ventricular mass, LVEDV – indexed LV end-diastolic volume, LA and RA area – indexed left atrial and right atrial areas.

Supplement Table. Global and Regional Radial Strain in the 4 pathology groups

| | Controls | HFpEF | HFmrEF | HFrEF | P# Value Controls vs HFpEF | P# Value Controls vs HFmrEF | P# Value HFpEF vs HFmrEF | P# Value HFmrEF vs HFrEF |
|--------------------------------------|----------|----------|----------|----------|----------------------------------|-----------------------------------|--------------------------------|--------------------------------|
| Global Radial Strain (%) | | | | | | | | |
| | 94.8±28 | 91.4±36 | 50.5±19 | 34.6±20 | 0.98 | <0.001 | <0.001 | 0.22 |
| Global Radial Strain Rate (%/s) | | | | | | | | |
| | 2.68±0.1 | 2.71±0.2 | 1.75±0.2 | 1.39±0.3 | 0.99 | 0.0015 | 0.0012 | 0.17 |
| Regional Radial Strain (%) | | | | | | | | |
| Basal | 99.1±50 | 99.8±49 | 44.4±22 | 25.6±14 | 0.99 | <0.001 | <0.001 | 0.368 |
| Mid | 86.8±24 | 91.5±41 | 49.6±17 | 37.7±23 | 0.95 | <0.001 | <0.001 | 0.53 |
| Apical | 98.3±25 | 82.9±47 | 57.5±37 | 40.5±31 | 0.57 | 0.005 | 0.12 | 0.44 |
| Regional Radial Strain Rate (%/s) | | | | | | | | |
| Basal | 2.74±0.8 | 2.55±0.7 | 1.59±0.6 | 1.08±0.5 | 0.79 | <0.001 | <0.001 | 0.048 |
| Mid | 2.69±0.4 | 2.90±0.8 | 1.88±0.5 | 1.43±0.9 | 0.80 | 0.005 | <0.001 | 0.18 |
| Apical | 2.62±0.6 | 2.69±0.8 | 1.77±0.7 | 1.67±0.9 | 0.99 | 0.006 | 0.002 | 0.97 |

Normal – control subjects, HFpEF – patients with HF with preserved EF, HFmrEF patients with HF with mid-range reduced EF, HFrEF – patients with HF with reduced EF, Apical –apical segments, Mid – mid-ventricular segments, Basal – basal segments. A p value < 0.05 is considered significant.