

### **Supplementary material**

Diffusion tensor imaging (DTI) is able to provide two main types of parameters: firstly, the mean diffusivity (MD) and the fractional anisotropy (FA) indicate the overall level of diffusion of the water molecules and the degree of restriction in the direction of diffusion, which in turn provides information on the direction of cardiomyocyte aggregates and their integrity[1]. The second is based on the eigenvectors of the diffusion tensor (including E1/E2/E3) and their derived helix angle (HA) and secondary eigenvector angle (E2 angle, E2A), which describes the orientation of sheetlets and depict the contractile state of myocardium[2]. In addition, "sheetlets" are secondary microstructures formed by aggregates of cardiomyocytes, approximately four cardiomyocytes thick, surrounded by collagenous matrix and interconnected with each other[3; 4], and DTI shows that this myocardial lamellar structure is nearly parallel to the epicardial plane in diastole, and then reorientates itself to tend to be perpendicular to this plane in systole, and that this dynamic change is an important mechanism in the process of ventricular wall thickening[5].

### **Reference:**

- 1 Nielles-Vallespin S, Scott A, Ferreira P, Khalique Z, Pennell D, Firmin D (2020) Cardiac Diffusion: Technique and Practical Applications. *J Magn Reson Imaging* 52:348-368
- 2 Ferreira PF, Kilner PJ, McGill LA et al (2014) In vivo cardiovascular magnetic resonance diffusion tensor imaging shows evidence of abnormal myocardial laminar orientations and mobility in hypertrophic cardiomyopathy. *Journal of cardiovascular magnetic resonance : official journal of the Society for Cardiovascular Magnetic Resonance* 16:87
- 3 LeGrice IJ, Smaill BH, Chai LZ, Edgar SG, Gavin JB, Hunter PJ (1995) Laminar structure of the heart: ventricular myocyte arrangement and connective tissue architecture in the dog. *Am J Physiol* 269:H571-582
- 4 Khalique Z, Ferreira PF, Scott AD, Nielles-Vallespin S, Firmin DN, Pennell DJ (2020) Diffusion Tensor Cardiovascular Magnetic Resonance Imaging: A Clinical Perspective. *JACC Cardiovascular imaging* 13:1235-1255
- 5 Nielles-Vallespin S, Khalique Z, Ferreira PF et al (2017) Assessment of Myocardial Microstructural Dynamics by In Vivo Diffusion Tensor Cardiac Magnetic Resonance. *Journal of the American College of Cardiology* 69:661-676