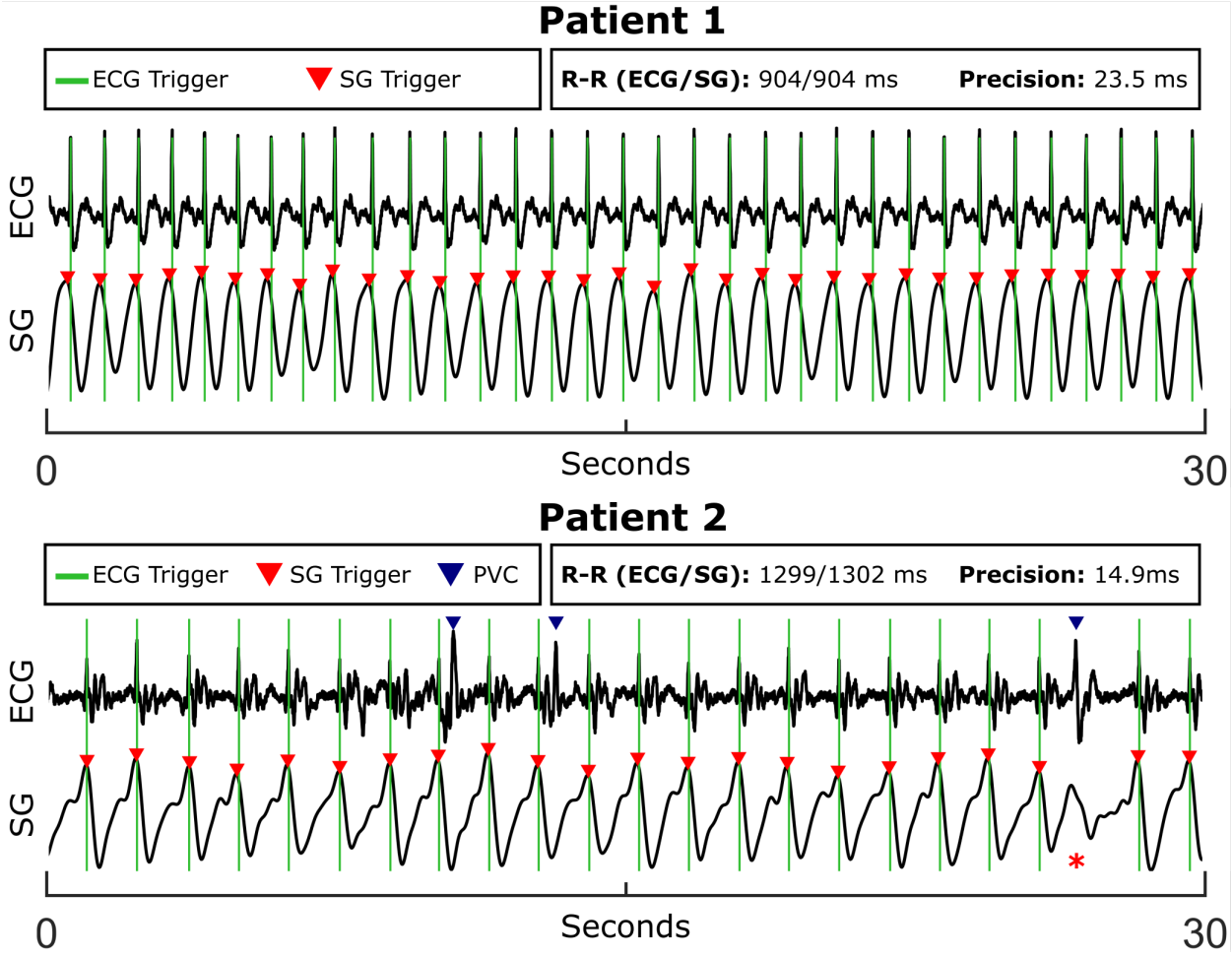
SUPPORTING INFORMATION



Supporting Information Figure S1: Comparison between the derived SG signal and synchronous ECG acquired in patients. Trigger points derived from ECG and SG are marked on the signal traces. Note the presence of premature ventricular contraction (PVC) in Patient 2 (blue triangles) as visible in the ECG. An example of an automatically rejected SG trigger coinciding with a PVC is denoted by the asterisk. However, not all PVC triggers manifested in the SG signal, which captures the mechanical motion of the heart.

	Patient 1		Patient 2	
Description	37-year-old male with a history of congenital pulmonary artery stenosis.		80-year-old male with coronary artery disease and premature ventricular contraction burden.	
Scanner	MAGNETOM Sola (1.5T)			
	SG 4D Flow	**2D-PC***	**SG 4D Flow**	**2D-PC**
FOV [mm]				
Frequency	300	380	320	380
Phase	300	285	320	285
Slice	179	N/A	185	N/A
Spatial Res. [mm]				
Frequency	3.1	2.0	3.3	2.0
Phase	3.1	2.9	3.3	2.9
Slice	3.2	6.0	3.3	6.0
Temporal Res. [ms]	45†	42	65†	118△
TE [ms]	2.5	2.3	2.6	2.3
TR [ms]	4.4	4.2	4.6	4.2
Flip Angle [degrees]	7	15	7	15
Receiver BW [Hz/px]	801	501	801	501
VENC [cm/s]	200	$150 - 200$	300	150
Respiratory Eff. [%]	50†	Breath-held	50†	Breath-held
Acquisition Time	5 min	$8 - 9$ s	5 min	12 s
Acceleration Rate	23†	GRAPPA, 2	26†	GRAPPA, 2

Supporting Information Table S1: MR acquisition parameters used in the patient study for the proposed self-gated 4D flow (SG 4D Flow) and conventional 2D phase-contrast (2D-PC) protocols. *Ranges indicate minimum and maximum values from the aggregate of all vessels imaged. †Values were determined retrospectively after data acquisition. △A lower temporal resolution was used to avoid corruption by cardiac arrhythmia in this patient. The images were, however, reconstructed on a temporal grid with 20 cardiac bins.

Supporting Information Video S1: Pathline video rendering of four anatomical views reformatted after ReVEAL4D reconstruction using the proposed self-gating pipeline in a healthy subject. Views are (A) left-ventricular outflow tract, (B) right-ventricular outflow tract, (C) three-vessel view oriented in a transverse plane, and (D) four-chamber view.

Supporting Information Video S2: Volumetric pathline rendering of the whole-heart after ReVEAL4D reconstruction using the proposed self-gating pipeline in one healthy subject. Renderings are displayed as follows: (A) apex oriented towards the camera, (B) apex oriented away from the camera, (C) transverse orientation at the level of the main pulmonary artery, and (D) rotation along the transverse axis.