Video Legends:

1. **Videoclip S1**: **Application of the Fetal Intelligent Navigation Echocardiography (FINE) method to a spatiotemporal image correlation (STIC) volume dataset of a fetus with dextrocardia, situs solitus, and complex congenital heart disease at 35 weeks of gestation** (also see Figure 1). Nine cardiac diagnostic planes are displayed automatically in a single template without automatic labeling. Next, automatic labeling occurs for the fetal left and right sides, cranial and caudal direction, each diagnostic plane, and anatomical structures. All of the nine echocardiography views are abnormal [diagnostic planes and/or Virtual Intelligent Sonographer Assistance (VIS-Assistance®)]. The three-vessels and trachea view diagnostic plane shows the well-developed leftward pulmonary artery arising from the dilated left ventricle, while a hypoplastic aorta is rightward and anterior to the pulmonary artery, and arises from the hypoplastic right ventricle (i.e. D-transposition of the great vessels). Note that the three-vessels and trachea view shows a ”Y-shape” configuration, in which the aorta is anterior to the pulmonary artery. In addition, automatic labeling by FINE is correct. The four-chamber view diagnostic plane shows dextrocardia, a dilated left ventricle, enlarged mitral valve with redundancy in leaflet tissue, severely hypoplastic right ventricle, tricuspid atresia caused by a thick membrane, enlarged right atrium, and large interatrial communication. Note that passive movement of the membrane of the tricuspid valve can be seen. However, this does not represent true tricuspid valve leaflet excursion and there is no true connection between the right atrium and ventricle. Note that automatic labeling of all four chambers by FINE is correct. The five-chamber view diagnostic plane shows findings similar to that of the four-chamber view, as well as a ventricular septal defect. The ”Ao” label here does not actually point to the aorta itself; however, the label is precisely where the aorta should exit from the hypoplastic right ventricle. In the left ventricular outflow tract diagnostic plane, both ventricles are seen, with the well-developed pulmonary artery arising from the left ventricle. For the short-axis view of great vessels/right ventricular outflow tract, VIS-Assistance® was activated to show this plane, which appears abnormal. The pulmonary artery arises from the dilated left ventricle (the ”RV” automatic label is incorrect here). In the abdomen view diagnostic plane, viscero-atrial situs solitus was determined by the location of the inferior vena cava (anterior and right of the spine), descending aorta (posterior and left of the spine), hepatic venous drainage (not shown here), right-sided liver, and stomach on the left side. For the ductal arch view, VIS-Assistance® was activated to show this image, which appears abnormal. The pulmonary artery arises from the dilated left ventricle (the ”RV” automatic label is incorrect here). For the aortic arch view, *triple VIS-Assistance*® was performed to obtain the plane displayed here. The ascending aorta is seen arising from the hypoplastic right ventricle, and narrowing in the transverse aortic arch and isthmus region is consistent with coarctation of the aorta. Note that automatic labeling of the aortic arch view by FINE is correct. The venae cavae diagnostic plane shows the superior and inferior

vena cava entering the right atrium. In the superior part of the image, tricuspid atresia (between the right atrium and ventricle), and both ventricles with the septum in-between them are visible. *A, transverse aortic arch; Ao, aorta; Desc., descending; IVC, inferior vena cava; LA, left atrium; LV, left ventricle; P, pulmonary artery; PA, pulmonary artery; RA, right atrium; RV, right ventricle; RVOT, right ventricular outflow tract; S, superior vena cava; SVC, superior vena cava; Trans., transverse*

2. **Videoclip S2**: **Virtual Intelligent Sonographer Assistance (VIS-Assistance®) of the abdomen/stomach view of the same case shown in Videoclip S1.** The left image is the diagnostic plane obtained through Fetal Intelligent Navigation Echocardiography (FINE). The right image shows the automatic navigational movements performed by VIS-Assistance®. Note that there are call-outs during the videoclip (e.g. ”Move caudad”), which inform the operator of the specific type of navigational movement occurring. Viscero-atrial situs solitus was determined by the location of the inferior vena cava (anterior and right of the spine), descending aorta (posterior and left of the spine), hepatic venous drainage, right-sided liver, and stomach on the left side. In the videoclip, the inferior vena cava and a hepatic vein are seen entering the right atrium on the right side. In addition the following is demonstrated: dextrocardia, a dilated left ventricle, enlarged mitral valve with redundancy in leaflet tissue, severely hypoplastic right ventricle, tricuspid atresia caused by a thick membrane, enlarged right atrium, large interatrial communication, and ventricular septal defect. Note that passive movement of the membrane of the tricuspid valve can be seen. However, this does not represent true tricuspid valve leaflet excursion and there is no true connection between the right atrium and ventricle. The three-vessels and trachea view is also demonstrated in the

VIS-Assistance® videoclip. The well-developed leftward pulmonary artery arises from the dilated left ventricle, while a hypoplastic aorta is rightward and anterior to the pulmonary artery, and arises from the hypoplastic right ventricle (i.e. D-transposition of the great vessels). The three-vessels and trachea view shows a ”Y-shape” configuration, in which the aorta is anterior to the pulmonary artery. There is no evidence of the ”double vessel” sign (dilated azygos vein and aorta), which is diagnostic of interrupted inferior vena cava with azygos continuation.

3. **Videoclip S3**: **Postnatal echocardiogram of the subcostal four-chamber view at day one of life** (also see Figure 2). Dextrocardia is evident (cardiac axis from base to apex pointing to the neonatal right side, which is the left side of the screen), along with a dilated left ventricle and hypoplastic right ventricle. There is a membrane which moves up and down between the right atrium and ventricle, but there is no true connection (tricuspid atresia). There is redundant atrial septal tissue bowing from right to left into the left atrium and a moderate-sized atrial septal defect in the secundum portion of the atrial septum. The ventricular septal defect is not seen in this imaging plane. LA, left atrium; LV, left ventricle; RA, right atrium; RV, right ventricle.

4. **<u>Videoclip S4</u>**: **Pediatric echocardiogram performed at 2 weeks of life post-Hybrid procedure** (also see Figures 5 and 6). The speed of the videoclip has been reduced by 50% for illustrative purposes. The subcostal four-chamber view (Left, gray scale; Right, color Doppler) is depicted, multi-beat acquisition sweeping posterior to anterior. Dextrocardia is evident (cardiac axis from base to apex pointing to the neonatal right side), along with a dilated left ventricle and hypoplastic right ventricle. There is a membrane which moves up and down between the right atrium and ventricle, but with no true connection (tricuspid atresia). Color flow is demonstrated from the left to right ventricle through the small, restrictive ventricular septal defect. Antegrade flow (blue color) is shown exiting from the left ventricle into the pulmonary artery. From the right ventricle, there is flow (blue color, end of sweep) through the aorta, which is smaller and rightward compared to the larger pulmonary artery. At the top of the videoclip, a stent (circular, white echogenic structure) is visualized in the main pulmonary artery from the previous Hybrid procedure. In addition, the left image shows the initial portion of the pulmonary artery bifurcation. (Note that the color Doppler bar orientation does not correspond to the color Doppler flow depicted in the heart, because the image has been flipped for illustrative purposes).