ACHA 2026 Research Grant Award

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Title: ***Remote Physiologic Phenotyping of Fontan Hemodynamics and Circulatory Reserve***

Adults born with only one pumping chamber of the heart often need a life-saving surgery called the Fontan operation. This surgery has helped many children survive into adulthood. However, adults living with Fontan circulation can develop serious health problems over time, including trouble with exercise, abnormal heart rhythms, heart failure, liver disease, lower quality of life, and shortened lifespan. Doctors currently do not have a simple, noninvasive way to continuously monitor how the Fontan circulation is working during daily life.

Current monitoring relies on heart imaging, exercise tests, rhythm monitors, and occasional heart catheterizations. These tests are important, but they provide only brief snapshots of health and may miss changes between appointments. Many adults with Fontan circulation also travel long distances to specialized heart centers, creating personal, financial, and healthcare burdens.

This study will test a new wearable ultrasound patch that can monitor heart and blood flow function without surgery or needles. The soft sensor is placed on the skin and can measure blood flow and related signals. These measurements may show how well the Fontan circulation responds to activity and recovers afterward.

We will enroll at least six adults with Fontan circulation who are already scheduled for a medically needed heart catheterization. Participants will wear the patch during catheterization so wearable measurements can be compared with direct heart pressure and blood flow measurements. They will then complete four weeks of home monitoring, including brief walking sessions three times per week.

We will study whether wearable ultrasound measurements are related to exercise ability, symptoms, quality of life, heart rhythm problems, heart imaging findings, and catheterization results. The goal is to identify early wearable markers of Fontan health that could help doctors detect worsening heart function before major health problems occur.

If successful, this project could shift Fontan monitoring from occasional clinic-based testing toward remote monitoring during daily life. This approach may help doctors personalize care, detect complications earlier, reduce unnecessary testing, lessen travel burden, and improve care for adults with Fontan circulation and other forms of heart disease present from birth.