Elite soccer players help define normal heart measures in competitive athletes

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Clinicians are often asked to assess competitive athletes with cardiovascular symptoms and to screen asymptomatic athletes for hidden

heart problems. This is especially common with soccer, the world's most popular sport. To provide guidance, a team led by investigators at Massachusetts General Hospital (MGH) conducted a study to determine what should be considered normal heart scan results in elite female and male soccer players. The findings are published in *JAMA Cardiology*.

When evaluating athletes, it's important for physicians to differentiate between normal exercise-induced cardiovascular adaptations and abnormal responses that are detrimental to health. Knowing the difference requires analyses of sport- and sex-specific data. To this end, researchers examined cardiovascular data from 122 female and 116 male athletes from screenings overseen by Aaron Baggish, MD, director of the Cardiovascular Performance Program at MGH and chief cardiologist for U.S. Soccer, at U.S. Soccer National Team training locations from 2015 through 2019.

The screenings included both electrocardiograms, which assess the heart 's electrical activity, and echocardiograms (heart ultrasound), which show the heart's structure. "Electrocardiograms that met international criteria for being abnormal were more common in the female athletes, but none of these individuals had evidence of underlying abnormalities on their heart ultrasounds," says lead author Timothy Churchill, MD, an investigator in Medicine at MGH. "We also found that athletes of both sexes frequently exceeded the general-population-defined normal values for a number of important measures of heart size, likely reflective of the athletes' hearts adapting to their exercise training." Churchill stressed that none of the athletes had very worrisome findings or signs of heart muscle disease that would restrict them from competition.

The investigators hope that their study will provide clinicians with a reference that can be used when assessing athletes who are seen for either pre-participation screening or evaluation of heart-related symptoms. "These types of assessments arise frequently and are

expected to become even more common as athletes return to competition in the setting of COVID-19 exposure or infection, given concerns that have emerged for potential cardiac involvement," says Baggish, who was senior author of the study. "We hope our data can contextualize the athletes' cardiac findings and help clinicians determine what is normal and what may suggest possible underlying disease."

More information: Timothy W. Churchill et al, Cardiac Structure and Function in Elite Female and Male Soccer Players, *JAMA Cardiology* (2020). DOI: 10.1001/jamacardio.2020.6088

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