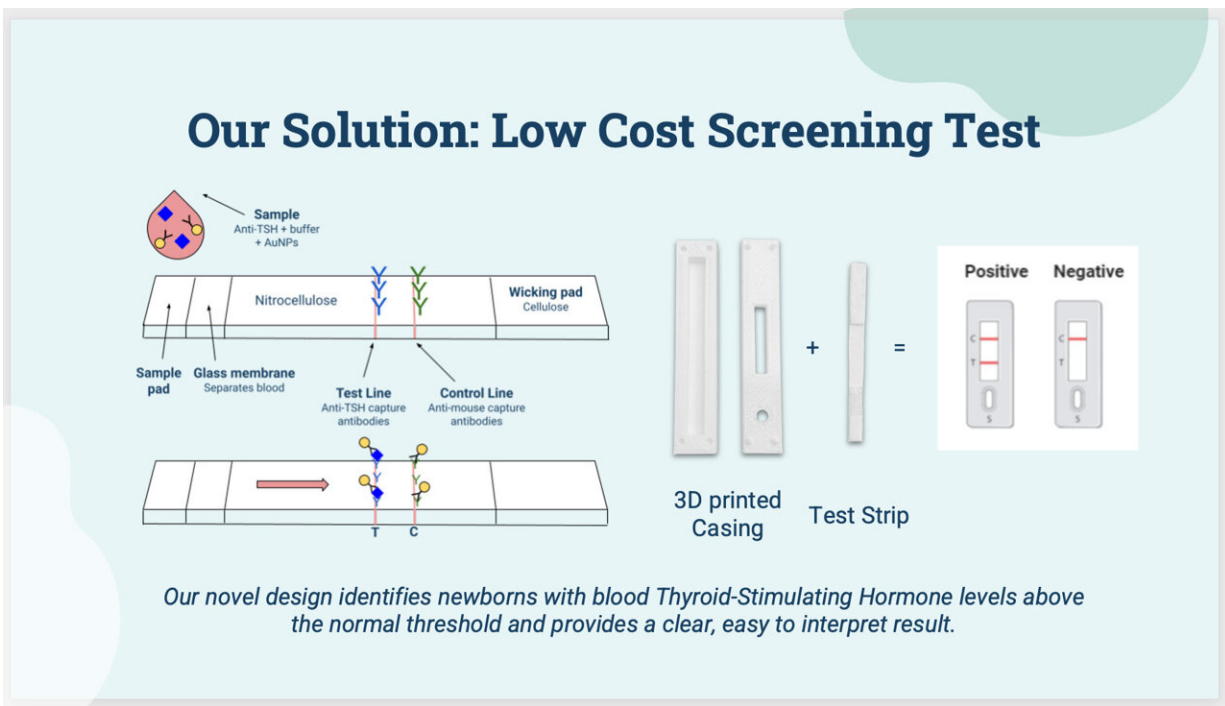


Rice University students design congenital hypothyroidism test for newborns

May 8 2023



The low-cost screening test developed by Rice University students identifies thyroid dysfunction in newborns and provides a clear, easy-to-interpret result. Credit: Team Test TSH/Rice University

For newborns with congenital hypothyroidism, early diagnosis spells the difference between a normal, healthy life and lifelong disability.

After learning about the heavy toll the disease takes on children born in

parts of the world where testing is limited or absent, a team of Rice University students came together to develop a low-cost screening tool that can detect abnormally high thyroid-stimulating hormone (TSH) levels indicative of dysfunction.

The point-of-care, paper-based test developed by team [Test TSH](#) members Alex David, Elise Erickson, Vanshika Jhonsa, Margaret Li and Alison Maniace "has the potential to impact the lives of thousands of people every year, especially in low-resource areas, allowing for early treatment and preventing the permanent disabilities that can result from untreated congenital hypothyroidism," according to Jasmine Nejad, the team's faculty mentor and a global health lecturer in the Rice360 Institute for Global Health Technologies.

Thyroid hormone is crucial to the development of infants' brain and [nervous system](#) and helps the heart, muscles and other organs function as they should. It also regulates how the body uses and stores energy and how it grows.

"At birth, babies with congenital hypothyroidism look normal, there's no obvious sign of this disorder, so the main roadblock to treatment in low-resource settings is the lack of widespread screening programs," Jhonsa said.

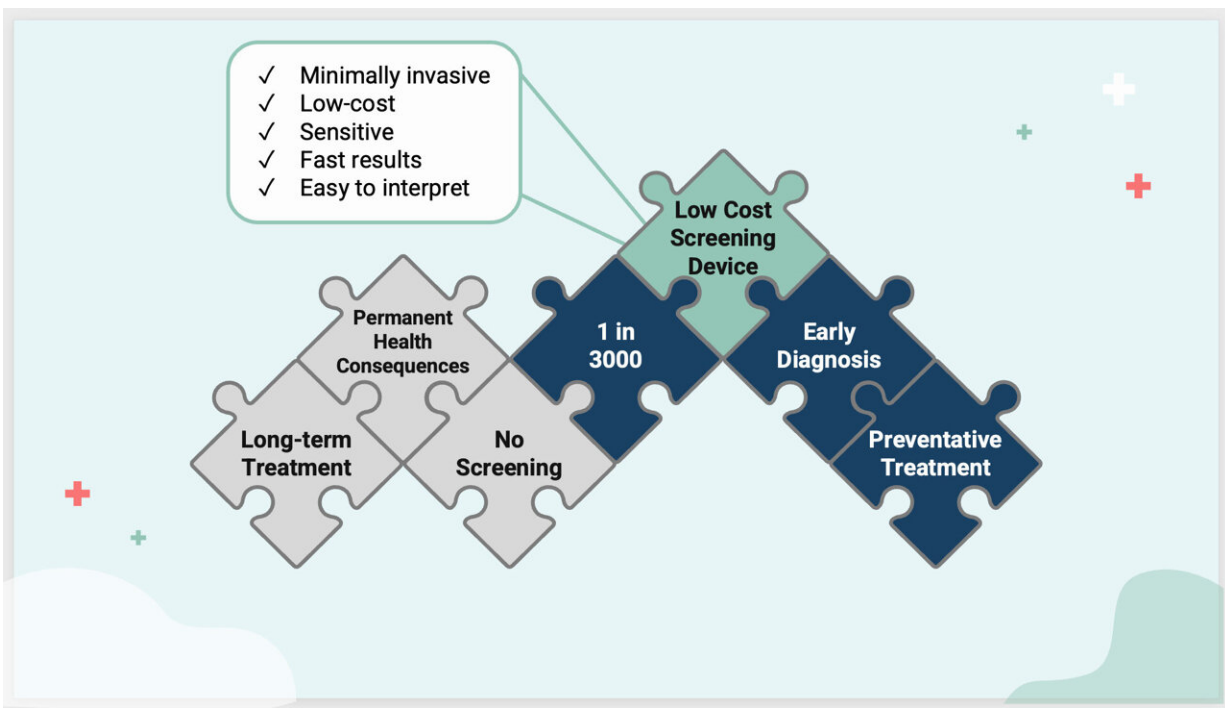
Taking inspiration from the design of the at-home COVID-19 test, the team came up with an easy-to-read test requiring only a small blood sample. They also created a 3-D-printed casing for portability and to reduce the risk of infection.

Jhonsa further explained that because the [thyroid gland](#) is underactive or absent in babies born with [congenital hypothyroidism](#), their system will try to compensate by overproducing thyroid-stimulating hormone.

"Thyroxine (T4) is responsible for the development of all body systems, including brain development, muscle development and so on," Maniace said. "A lack of T4 early in life will cause irreversible developmental delays if left untreated, which is why early-life diagnosis is so crucial."

"In the U.S., newborns are by default screened for a lot of congenital diseases, hypothyroidism being one of them," Li said. "In [low-resource settings](#), there's no infrastructure in place to conduct widespread testing for infants, making [early diagnosis](#) difficult both in terms of cost and access."

"Testing infrastructure in the U.S. can take up a lot of space and resources, since you'll typically have several technicians running these tests," David said. "The difference between \$1 or even just a few cents for a test versus the requirements of having this kind of infrastructure in place is just huge."



Early diagnosis is critical for newborns with congenital hypothyroidism, but affordable and easy-to-access testing options are unavailable in many low-resource areas around the globe. Credit: Team Test TSH/Rice University

Nejad said the device "could also lower the cost for screening in general as well as offer an adaptable platform that could provide accessible screening for other types of thyroid dysfunction that can occur later in life."

"The beauty of this screening tool is that you can adapt it to test for different ages and even for other conditions," Jhonsa said.

The students' ability to draw from their diverse expertise in multiple fields of study earned them the Best Interdisciplinary Engineering Design Award at the George R. Brown School of Engineering's annual Huff OEDK Engineering Design Showcase held last month at the Ion. The team also won first place in the global health track of the Johns Hopkins Healthcare Design Competition and second place in the Rice360 Global Health Technologies Design Competition.

"Vanshika and Elise are social policy analysis majors, I'm in health care sciences, Alex is a biosciences major and Alison designed her own major," Li said. "We are a diverse group in terms of our background of study, and our project has an interdisciplinary aspect as well. We were working in the wet lab but also doing research on marketing and our target population."

The team's passion and drive compensated for its relative inexperience with the different aspects of the engineering design process.

"Since none of us are really engineers, being thrust into this new space

was definitely challenging in the beginning," Jhonsa said. "But it was a great learning experience and it was very rewarding at the end to have a product that works."

Maniace added that it was "really inspiring to see that with a lot of passion for a project like this in global health we can actually have an impact."

Dr. Kristina Tebo, who initially pitched the idea, said she "was happy the project was accepted and am thrilled at how the team has brought it to life."

The team's clinical mentors were Dr. Selorm Dei-Tutu, assistant professor of pediatrics in the division of diabetes and endocrinology at Baylor College of Medicine and a practitioner at Texas Children's Hospital, and Tebo, assistant vice president of global health initiatives, assistant professor of pediatrics in the division of pediatric hospital medicine and co-director of the Pediatric Global Health Program at UTHealth Houston's McGovern Medical School.

"Our mentors and professors and everyone we've learned from have been incredible," David said. "The success we've had on this project really speaks to how much faculty cares about students and really puts effort into helping them see their projects through to the end."

Provided by Rice University

Citation: Rice University students design congenital hypothyroidism test for newborns (2023, May 8) retrieved 18 April 2024 from <https://medicalxpress.com/news/2023-05-rice-university-students-congenital-hypothyroidism.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private

study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.