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Scientists Developing Diagnostic Test for Childhood Disease Linked to Covid-19

The Seattle Children's Research Institute and life-science company Prevencio tap machine learning techniques to predict the presence of Kawasaki disease
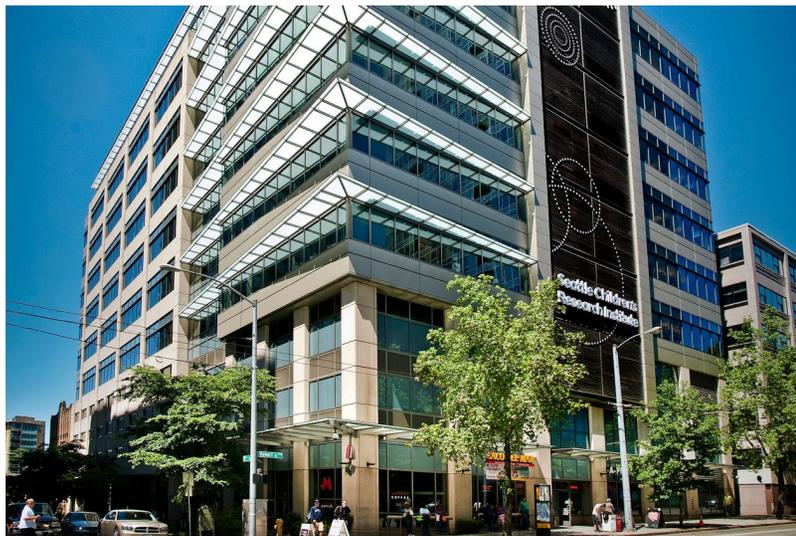
Seattle Children's Research Institute and life-science company Prevencio are using artificial intelligence to create a test for Kawasaki disease, a rare condition recently linked to Covid-19.

PHOTO: SEATTLE CHILDREN'S

By **VINOD SREEHARSHA**

May 29, 2020 5:30 am ET | **WSJ PRO**

Scientists are turning to artificial intelligence in an attempt to develop the first diagnostic test for Kawasaki disease that will be available for widespread use. Kawasaki is a rare but dangerous childhood condition that was recently linked to Covid-19.

The Seattle Children's Research Institute, one of the country's leading pediatric research centers, and life-science company Prevencio Inc. are tapping machine learning techniques to analyze blood samples for protein markers and other variables to accurately predict the presence of the disease.

Prevencio, in collaboration with researchers at the Massachusetts General Hospital, previously used machine learning to create blood tests to diagnose cardiovascular illnesses.

Kawasaki is an acute illness that primarily affects children. It can result in inflammation in one's arteries. It is the most common cause of acquired permanent heart disease in children. It typically affects 5,000 to 7,000 children in the U.S. each year, according to Michael Portman, director of pediatric cardiovascular research at Seattle Children's Research Institute and a pediatric cardiologist at Seattle Children's Hospital. The research institute is an arm of the hospital.

When diagnosed and treated early, most patients can fully recover.

But diagnosing Kawasaki is tricky. Physicians typically detect it by the presence of a persistent fever combined with four other clinical symptoms including red eyes and swollen lips. Yet patients don't consistently show all the signs. Supplementary lab analyses can help but often don't rule out other conditions.

"It's not cut and dry," said Dr. Portman. He noted that many cases get missed and a lot
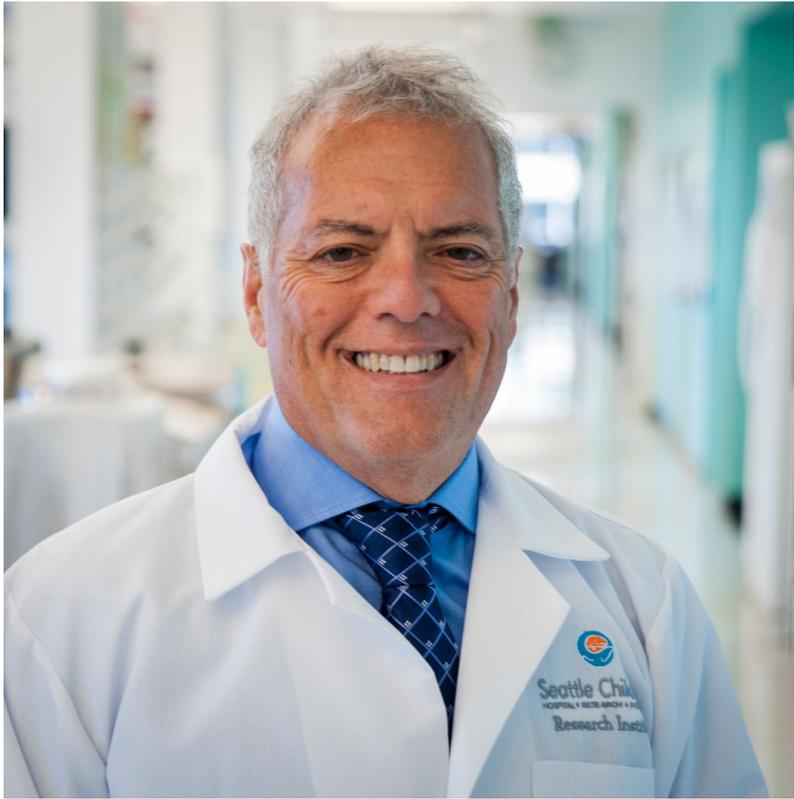
Michael Portman, director of pediatric cardiovascular research at Seattle Children's Research Institute.

PHOTO: SEATTLE CHILDREN'S

of patients are falsely diagnosed.

Amid the Covid-19 pandemic, the lack of a diagnostic test is becoming more concerning. Over the past two months, physicians have observed a surge in the number of individuals exhibiting symptoms common to Kawasaki disease, many who also test positive for the virus that causes Covid-19.

The Centers for Disease Control and Prevention described the condition as multisystem inflammatory syndrome in children, or MIS-C. Normally healthy children seem to contract it several weeks after getting infected with the coronavirus.

Without a definitive blood test, physicians are unsure if the cases they are now seeing are Kawasaki disease or a new syndrome, said Dr. Portman.

There are other efforts to develop a Kawasaki test. Researchers at the University of California at San Diego School of Medicine and Imperial College London in the U.K. have found that certain gene patterns can identify the illness. That effort is co-led by Jane Burns, professor at UCSD School of Medicine and director of the Kawasaki Disease Research Center. That initiative is in the research stage and doesn't use artificial intelligence.

The Seattle Children's Research Institute and Prevencio plan to use machine learning methods to create a test panel, or a group of tests, to determine the presence of Kawasaki. While many protein markers individually rise or fall when Kawasaki is present, none do so with anywhere near the statistical specificity or sensitivity required to make a clear-cut diagnosis.

Machine learning will analyze various permutations of those proteins and other clinical variables to determine which arrangements signal the presence of the disease. In doing so, it could also help determine whether Kawasaki and Covid-19 related MIS-C are totally different illnesses or related illnesses.

Scientists consider AI promising because it can leverage smaller sample sizes, important for a rare illness, and connect the dots in a disease with multiple underlying factors.

"AI is not necessarily ready to tackle every problem in medicine," said Eric Perakslis, a Rubenstein Fellow at Duke University. But, he said, "Kawasaki disease is a strong candidate due to the complexity, diversity, and interdependency of many types of data." Mr. Perakslis, who isn't involved in the research, served from 2011 to 2013 as chief information officer and chief scientist at the Food and Drug Administration.

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"This is smart to me," said Mr. Perakslis of Prevencio's initiative with Seattle Children's.

This week, Seattle Children's started providing blood samples from two groups that each have about 100 patients, one diagnosed with Kawasaki disease and the other a control. These patients precede the pandemic and so will be easier to study.

Rhonda F. Rhyne, president and chief executive officer of Prevencio, expects to have a preliminary test available quickly. "I would anticipate within four to six weeks we will have a panel," she said.