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Pfizer's Novel Prediction Model, Derived from Machine Learning, Shows Robust Performance for Identifying Heart Failure Patients At-Risk for Wild-Type Transthyretin Amyloid Cardiomyopathy, a Rare and Life-Threatening Condition

Tuesday, May 11, 2021 - 12:51pm

— Data published in Nature Communications reveals 87% accuracy in predicting wild-type transthyretin amyloid cardiomyopathy (wtATTR-CM) heart failure (HF) patients compared to non-amyloid HF patients

— This algorithm, built to help identify patients at-risk for wtATTR-CM, is the first to leverage artificial intelligence (AI)/machine learning across medical claims data

— Using the model's systematic framework based on medical claims data, Pfizer developed EstimATTR, an online resource designed to estimate the probability that a hypothetical patient with heart failure may have wtATTR-CM

New York, May 11, 2021 — Pfizer Inc. (NYSE: PFE) today announced that a new study published in Nature Communications demonstrates the robust performance of a novel prediction model, derived from machine learning, for identifying at-risk wild-type transthyretin amyloid cardiomyopathy (wtATTR-CM), a rare and life-threatening condition that results in progressive heart failure. The model, which was evaluated using medical claims and electronic health record (EHR) data sets, performed with 87 percent accuracy in predicting patients with heart failure associated with wtATTR-CM. The model also confirmed that the clinical profile of patients with wtATTR-CM is consistent with existing literature. The model was developed by Pfizer with active involvement from researchers at the Northwestern University Feinberg School of Medicine and the Brigham and Women's Hospital.

"With artificial intelligence and machine learning, we are discovering new digitally intuitive ways to help enable healthcare providers identify and appropriately diagnose patients with rare and underdiagnosed diseases like wtATTR-CM," said Suneet Varma, Global President, Rare Disease, Pfizer. "Today's publication in Nature Communications demonstrates that partnerships with clinicians along with the development of AI-based prediction tools could help doctors suspect and appropriately diagnose patients with this often-overlooked condition."

ATTR-CM is an underrecognized and life-threatening disease caused by unstable transthyretin proteins that misfold and aggregate into amyloid fibrils that build up in the heart and other parts of the body. The buildup of

amyloid causes the heart muscle to stiffen over time, eventually leading to heart failure. It is estimated that approximately 100,000 people in the United States have ATTR-CM, with the vast majority undiagnosed. The most common type of ATTR-CM is wild-type ATTRCM, which is associated with aging and predominantly affects men over age 60. If left untreated, the prognosis for patients with wtATTR-CM worsens progressively, including a decline in functional status and quality of life, which is why early detection is imperative to managing this disease. However, delays in diagnosis occur because wtATTR-CM is often misdiagnosed as other, more common forms of heart failure.

“In addition to validating Pfizer’s novel machine learning approach to suspecting wtATTR-CM and identifying additional cardiac and non-cardiac conditions associated with the disease, the results from our study provide hope for the future as we look to one day successfully employ predictive tools within healthcare systems,” said Sanjiv J. Shah, M.D., Northwestern University Feinberg School of Medicine. “With technology that can enable doctors to predict at-risk patients faster and more accurately, there is potential to help more people achieve a correct diagnosis at an early stage in their disease so appropriate treatment can be initiated, which is critical for a progressive condition like ATTR-CM, with a life expectancy of only 2 – 3.5 years on average after diagnosis if untreated.”

Unlike conventional statistical approaches, machine learning can more efficiently evaluate complex interactions across multiple input predictors, and in this particular model, was used to automate the suspicion of wtATTR-CM based on associated clinical conditions. The model, which was developed by Pfizer, in consultation with Dr. Shah and Rahul Deo, M.D., Ph.D., Brigham and Women’s Hospital, was trained using real world data derived from a dataset comprising of millions of de-identified unique heart failure patient records of which approximately one thousand had wtATTR-CM, and was evaluated in three external nationally representative cohorts and an external single-center EHR cohort at Northwestern Memorial Hospital (Chicago, IL). By applying the machine learning model to other patient datasets for comparison of accuracy and results, we confirmed that the model was robust and could evaluate patient data in diverse settings and differentiate heart failure due to wtATTR-CM from other causes. The model is not designed to self-learn and improve based upon presented data.

“At Pfizer, our approach to supporting doctors in the suspicion and appropriate diagnosis of patients with rare diseases combines science with digital innovation,” said Lidia Fonseca, Chief Digital & Technology Officer, Pfizer. “Leveraging artificial intelligence and machine learning, our model helps paint a broader picture of the signs and symptoms of wtATTRCM that can be overlooked and may ultimately help predict at-risk patients.”

On September 23, 2020, Pfizer launched the wild-type EstimATTR, a web-based educational tool, based on data adapted from the AI algorithm, for U.S. healthcare providers to help estimate the probability that a hypothetical patient with heart failure may have wtATTR-CM. The wild-type EstimATTR harnesses learnings from the model, transforming it into a simple educational only interactive tool comprised of 11 key clinical features of wtATTR-CM that are commonly associated with wtATTR-CM.

Pfizer Rare Disease

Rare disease includes some of the most serious of all illnesses and impacts millions of patients worldwide, representing an opportunity to apply our knowledge and expertise to help make a significant impact on addressing unmet medical needs. The Pfizer focus on rare disease builds on more than two decades of experience, a dedicated research unit focusing on rare disease, and a global portfolio of multiple medicines within a number of disease areas of focus, including rare hematologic, neurologic, cardiac and inherited metabolic disorders.

Pfizer Rare Disease combines pioneering science and deep understanding of how diseases work with insights from innovative strategic collaborations with academic researchers, patients, and other companies to deliver transformative treatments and solutions. We innovate every day leveraging our global footprint to accelerate the development and delivery of groundbreaking medicines and the hope of cures.

Click here to learn more about our Rare Disease portfolio and how we empower patients, engage communities in our clinical development programs, and support programs that heighten disease awareness.

About Pfizer: Breakthroughs That Change Patients' Lives

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