



Sema4 and GNS Healthcare Announce Collaboration Using REFS™ Causal Machine Learning and Simulation AI Platform

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Working Towards New Therapies for Cardiovascular Disease

Stamford, Conn. and Cambridge, Mass. – June 27, 2017 – Sema4, an interdisciplinary health information company with expertise in collecting diverse data, building computational models of disease and unlocking solutions to disease, today announced it is leveraging [GNS Healthcare's](#) (GNS), REFS™ (Reverse Engineering and Forward Simulation) causal machine learning and simulation platform to further aid Sema4 in the discovery and development of novel disease therapies and the application of these drugs in patient care.

Sema4 CEO [Eric Schadt, PhD](#), and his team are experts in designing studies to collect the data required to model disease and interpreting these models to identify targets for disease treatments. Through close partnerships, Sema4 also brings to bear the clinical expertise and patient data required for the modeling work. GNS, a leading precision medicine company, is a pioneer in the application of causal machine learning technology to answer healthcare's most pressing questions. Their REFS platform, complementary to Sema4's assets, turns large and diverse patient data streams into mechanistic computer models that when simulated reveal new pathways, drug targets and diagnostic markers that can lead to new drugs that are better matched to individual patients.

Sema4 and GNS will collaborate to maximize various data resources such as longitudinal EMR records, next generation sequencing, proteomics, and other 'omic data. The REFS technology uses a unique hypothesis-free approach that reverse-engineers models of causal biological mechanisms from large-scale data streams, and then simulates interventions into those models to unravel the hidden drivers of diseases and drug response, patient by patient.

"This is an exciting collaboration that will accelerate our understanding of disease mechanisms," said Dr. Schadt, who has published several hundred papers in the area of the computational modeling of complex biological systems in cardiovascular disease, obesity, cancer, and other diseases. "The ultimate goal in combining GNS Healthcare's unique technology with Sema4's extensive disease modeling experience and growing volume of data is the development of individualized and life-saving treatments for patients across many diseases."

This collaboration will first focus in cardiovascular disease, where Sema4 will work with GNS to use REFS to discover underlying drivers of the disease. With these insights, the parties will be able to identify which existing treatments may ameliorate cardiovascular disease, and identify opportunities for the research and development of next-generation treatments.

"GNS' collaboration with Sema4 to leverage its REFS™ technology shines a light on the drivers of cardiovascular disease, and has the potential to rapidly accelerate the discovery of transformative therapeutics," said Iya Khalil, PhD, Co-Founder and Chief Commercial Officer of GNS Healthcare. "Our unique causal machine learning and simulation technology gives clinicians and researchers the power to simulate billions of "what-if" interventions, making complex disease systems understandable, and brings the promise of precision medicine within reach of patients everywhere."

About Sema4

Sema4 is a health information company that is committed to providing open access to data and creating practical tools that help patients, clinicians, and researchers better diagnose, treat, and prevent disease. Sema4 is constructing a more comprehensive picture of health by combining a wealth of clinical experience that informs the answers that patients and providers are seeking, the world-class academic research that illuminates new directions, and the pioneering information science that puts all the pieces together. Sema4 is a venture of the Mount Sinai Health System, an integrated health system that is internationally recognized for its excellence in research, patient care, and education.

For more information, please visit sema4genomics.com and connect with Sema4 on [Facebook](#), [Twitter](#) and [YouTube](#).

About GNS Healthcare

GNS Healthcare applies causal machine learning and simulation technology to predict which treatments will work for which patients, improving individual patient outcomes and the health of populations, while reducing the total cost of care. The GNS technology is based on its MeasureBase™ data integration architecture and patented REFS™ (Reverse Engineering and Forward Simulation) causal inference and simulation engine. Health plans, bio-pharmaceutical companies, healthcare providers, foundations, academic medical centers, and self-insured employers use GNS' cloud-based solutions to solve pressing and costly problems including those surrounding metabolic syndrome, medication adherence, end-of-life care, preterm birth, personalized care pathways in specialty care, oncology, and diabetes, new drug target discovery, patient stratification in clinical trials, and more. GNS solutions focus on reducing adverse events, slowing disease progression, and improving therapeutic effectiveness through

precision matching that maximizes impact on individual patient health outcomes while reducing wasteful spending and downstream medical costs.

For more information, visit: www.gnshealthcare.com and connect with us on [Facebook](#), [Twitter](#), and [LinkedIn](#).

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