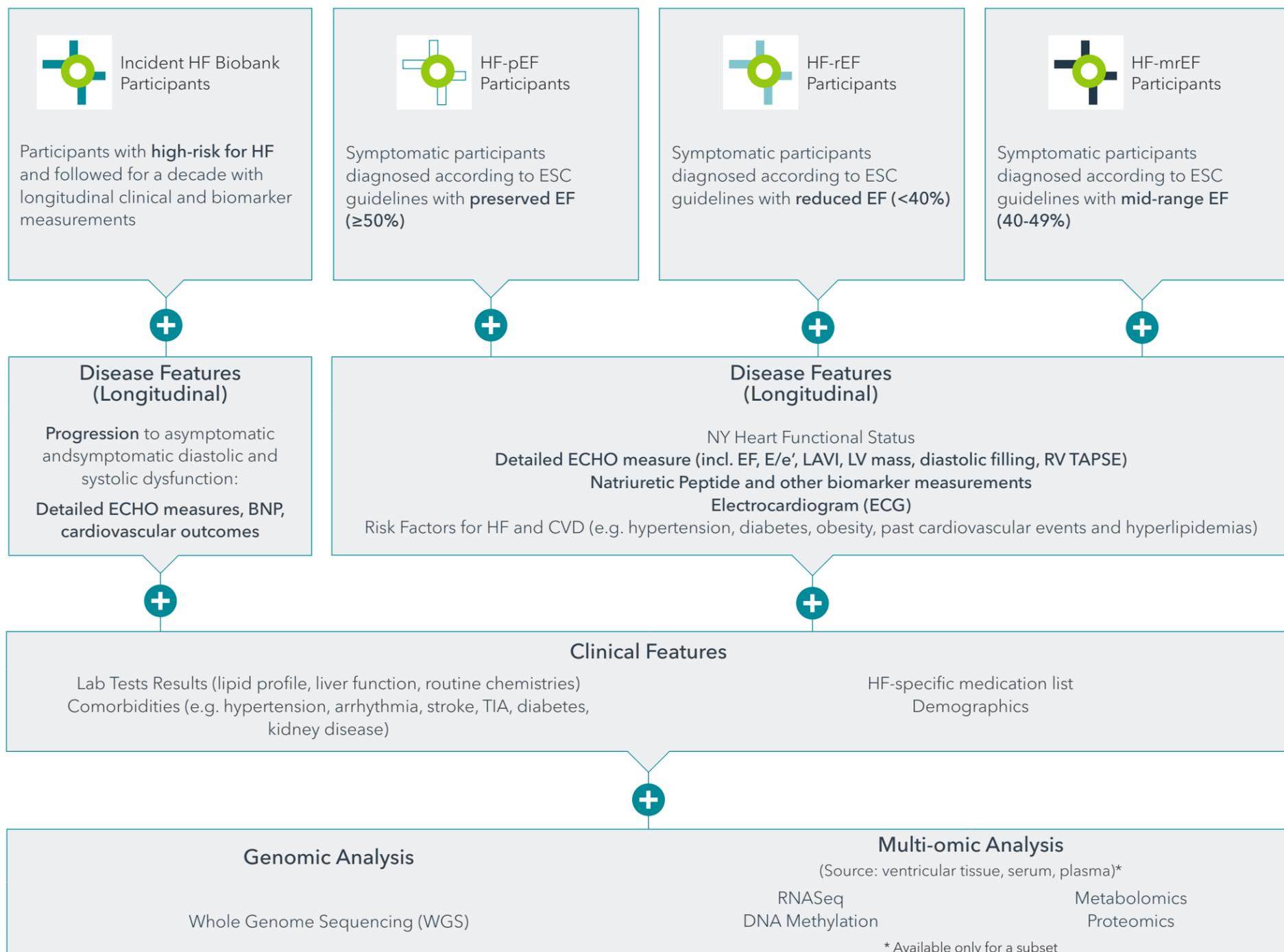# Heart Failure (HF)
Drug Target Validation, Prioritization and Discovery

genuity science™

There are no drugs effective for Heart Failure with preserved ejection fraction (HFpEF) and despite therapies for Heart Failure with reduced EF (HFrEF), mortality rates remain high. To validate, prioritize and discovery new targets, we are building a large clinical omics dataset of several thousand participants, which includes Whole Genome Sequencing (WGS) and detailed and longitudinal clinical and imaging data, of both major Heart Failure subtypes from Heart Failure units. We also include an Incident HF study data.

> " Drug targets with genetic validation are 2x more likely to be approved.
>
> King et al, 2019, PLOS Genetics "

Incident HF Biobank Participants

Participants with **high-risk for HF** and followed for a decade with longitudinal clinical and biomarker measurements

HF-pEF Participants

Symptomatic participants diagnosed according to ESC guidelines with **preserved EF (≥50%)**

HF-rEF Participants

Symptomatic participants diagnosed according to ESC guidelines with **reduced EF (<40%)**

HF-mrEF Participants

Symptomatic participants diagnosed according to ESC guidelines with **mid-range EF (40-49%)**

Disease Features (Longitudinal)

Progression to asymptomatic andsymptomatic diastolic and systolic dysfunction:

Detailed ECHO measures, BNP, cardiovascular outcomes

Disease Features (Longitudinal)

NY Heart Functional Status
Detailed ECHO measure (incl. EF, E/e', LAVI, LV mass, diastolic filling, RV TAPSE)
Natriuretic Peptide and other biomarker measurements
Electrocardiogram (ECG)
Risk Factors for HF and CVD (e.g. hypertension, diabetes, obesity, past cardiovascular events and hyperlipidemias)

Clinical Features

Lab Tests Results (lipid profile, liver function, routine chemistries)
Comorbidities (e.g. hypertension, arrhythmia, stroke, TIA, diabetes, kidney disease)

HF-specific medication list
Demographics

Genomic Analysis

Whole Genome Sequencing (WGS)

Multi-omic Analysis
(Source: ventricular tissue, serum, plasma)*

RNASeq   Metabolomics
DNA Methylation   Proteomics

* Available only for a subset

Move Rapidly from Data to Insight

Cohort Analytics Platform

Leverage our tools and in-house expertise to reveal the biological drivers/underlying biology represented in this clinical omics dataset. Data is provided in a managed environment with the tools and flexibility to accelerate time to insight.

Managed Cloud Environment	Data Lake Management	Cohort Analytics	Workspaces	Professional Services
Infrastructure and storage management	Onboarding longitudinal genomic sequence and variant data and phenotypes	Case-control definition	Desktop application	Specialized customer support services
Software stack and updates	Versioned reference datasets and summary statistics	Association studies at SNP and gene level	Notebook portal	Ad hoc analysis
Security and monitoring		Extensive functional and public GWAS annotation	API	Ongoing training

AI / Advance Analytics Services

Leverage our biologically validated AI to reveal causal driver genes and biology.

Ensemble A.I. Pipeline

Data Preprocessing
Curation and harmonization

> **Feature Learning**
Dimensionality reduction without information loss

> **Combined Machine and Deep Learning**
Classification & feature ranking

> **Probabilistic Programming**
Driver gene identification via causal inference

> **Natural Language Processing**
Biological context confirmation