

USING AI TO DISCOVER **GENETIC** **MODIFIERS** IN HUNTINGTON'S DISEASE

MARENOSTRUM5 ACC

Led by



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1 WHY IS IMPORTANT TO RESEARCH HUNTINGTON'S?



Huntington's disease is a **neurodegenerative, fatal disease** that is inherited and is caused by a repeating pattern (CAG) in DNA

Patients carry the same genetic mutation, but symptoms appear at **really different ages**



Current linear models can't explain it, so further and **more precise research** is essential

THE ROLE OF HPC RESOURCES

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The team used different **cutting-edge AI methods** to study more than 9.000 Huntington's disease genomes

The amount of genomes, iterations and **the large scale of the simulations** made the use of HPC resources critical in the research project



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ONSET TIME IS LINKED TO **CAG LENGTH**



For the first time, they discovered that different biological mechanisms influence when the symptoms appear

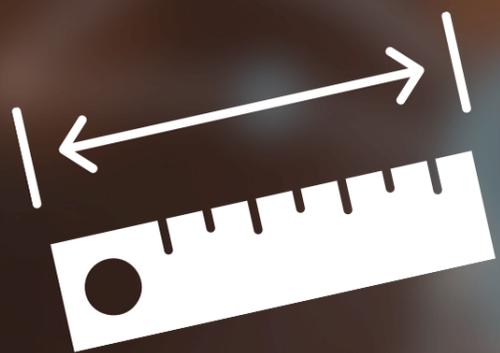
With moderate inherited CAG repeats, **DNA repair** matters most; with very long repeats, **protein cleanup** does



They also identified **new and known genes and switches** that shape the age where symptoms appear

A NEW FRAMEWORK TO STUDY NEURODEGENERATIVE DISEASES

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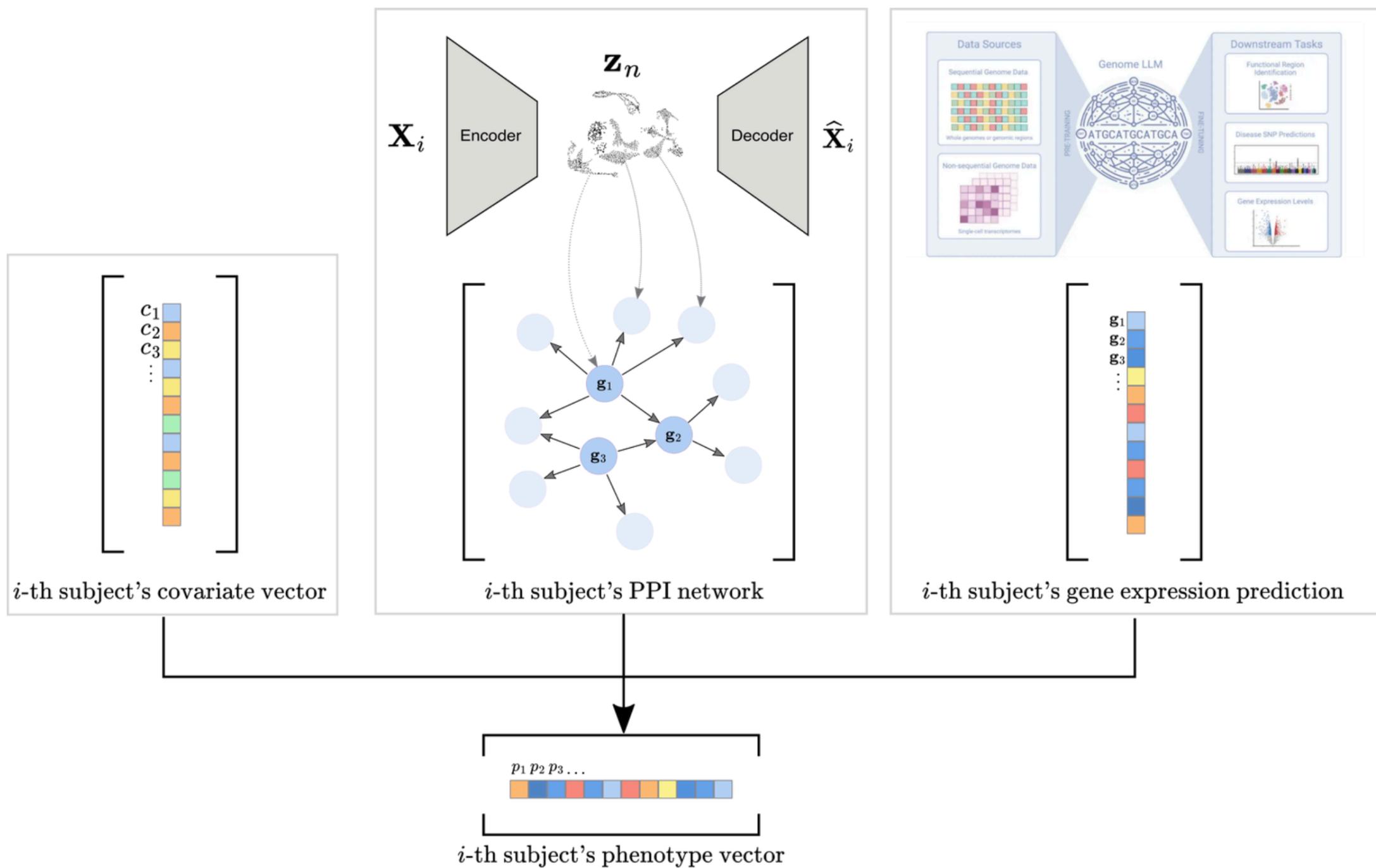


They identified certain biological mechanisms that **influence the symptom onset time** depending on the patient's CAG length

Using this approach, they also identified **DNA changes** that could have direct impact on **how the disease forms**



This establishes **a new, efficient, and powerful framework** for studying Huntington's and other neurodegenerative diseases



For the first time, the authors used gene expression predictions from a genomic language model to create a multimodal phenotype prediction model

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