Genomics for Next Generation Healthcare in Haematological Diseases

The consortium of GenoMed4All - *Genomics and Personalised Medicine for all through Artificial Intelligence in Haematological Diseases* is pleased to announce the launch of an ambitious **joint initiative** selected and granted by the European Commission under the Horizon 2020 Research & Innovation programme.

GenoMed4All will develop a secure and private data sharing platform based on **Federated Learning** for the pooling of **genomic, clinical data** and **other high-throughput "-omics" health data**. The ultimate goal is to unleash the power of **novel Artificial Intelligence (AI) models** to advance research in **personalised medicine** for **haematological diseases**, combining already-established clinical-pathological parameters with advanced genomic profiling to create innovative **diagnostic, prognostic** and **therapeutic** strategies.

Haematological diseases involve a large group of up to **450 disorders** resulting from abnormalities of blood cells, lymphoid organs and coagulation factors, generally divided in groups of oncological or non-oncological diseases. The majority have a genetic background and they represent a **public health challenge**: haematological malignancies account for about 5% of cancers, most can cause chronic health problems and many are life-threatening conditions. In 2016, the European Haematology Association (EHA) evaluated the financial burden of blood disorders on European society at €22.5 billion per year.

GenoMed4All will develop **3 application cases** covering **common** and **rare** oncological (Myelodysplastic syndromes and Multiple Myeloma) and non-oncological (Sickle Cell Disease) haematological diseases. AI solutions will be implemented to **enhance** the diagnostic capacity, **assess** treatment options and **predict** disease outcomes.
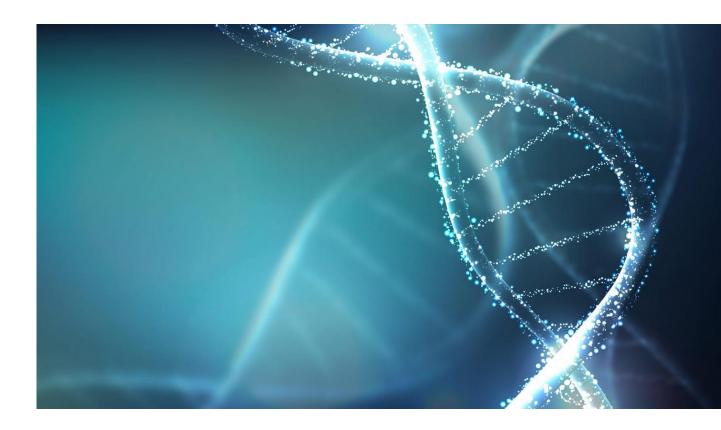
GenoMed4All's **Federated Learning** will seize the power of **High Performance Computing** facilities and key EU networks like **ERN-EuroBloodNet**, pooling resources from hospital registries, data processing tools, and pre-existing repositories to support clinical research and decision making. Our mission is to **link Europe's most relevant genomic repositories** in haematological diseases, facilitating **standardized sharing** of **cross-**

border data, ensuring full compliance with **data protection** legislation and **ethical principles**, and thus demonstrating the potential and benefits of **trustable** and **explainable AI technologies** in personalised medicine.

Our **Key Results** in a nutshell:

- ❑ **66** clinical sites repositories connected from ERN-EuroBloodNet.
- ❑ **20+** additional genomics data repositories linked.
- ❑ **10%** increase in prediction accuracy for genomic landscaping models.
- ❑ **80%** increase in prognosis accuracy and individual treatment response.
- ❑ **15%** quality boost in precision and recall for personalized outcome and treatment.

GenoMed4All will span **4 years** and mobilize a large consortium of **23 key partners** from Spain, Italy, Germany, France, Cyprus, Greece and Denmark, covering the whole value chain of **clinical**, **regulatory** and **ethics** research, **academia**, **healthcare**, disruptive **tech** and **digital** service providers.

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