HLIQ™ WHOLE GENOME

INFORMATION FOR PHYSICIANS

FREQUENTLY ASKED QUESTIONS

HLIQ Whole Genome report is currently available only to specific business partners of HLI. To provide you more information on the HLIQ Whole Genome test and the resources available to physicians, below are answers to a number of frequently asked questions.

Q: WHAT IS A WHOLE GENOME?

A: Genomics may or may not have been a focus in your training, so by way of quick refresher for your patients, we are all made up of trillions of cells. Tightly coiled within the nucleus of each cell is the DNA required to create each of us. You not only inherit physical traits from your parents, but also an operating system that could put you at a higher risk for certain diseases.

To get a sense of the size, think of your genome as an encyclopedia made up of many volumes. Each person has a set of 46 volumes and each of these books represents an individual chromosome. Each page would be a different gene and the words your DNA.

Q: WHAT IS WHOLE GENOME SEQUENCING?

A: Human Longevity, Inc.—your health intelligence partner—has assembled one of the world's largest sequencing centers at our La Jolla, California headquarters. Onsite we use the latest technology to examine all of your DNA in a process known as Whole Genome Sequencing.

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Part of what makes each of us unique are the genes that make up our genomes. Using whole genome sequencing, we're able to read through DNA and the coding it provides for genes. We're also able to identify changes or errors in the genetic code, which are referred to as variants, which are also unique identifiers in your genome.

Through our proprietary analysis from our team of expert scientists and computing specialists, you will learn about variants your patients have that make them different from other populations. Sometimes variants can lead to a higher risk of certain diseases or protect you from others. We learn more about your individual genome by studying it against the tens of thousands of genomes in our database. HLI has leveraged cutting-edge technology to truly understand you and make your healthcare more personal, predictive and preventative.

Q: WHAT CAN MY PATIENT LEARN THROUGH WHOLE GENOME SEQUENCING?

A: By having their genome sequenced, a person can better understand their genetic make-up to identify health risks. With the help of you, their physician, you can partner to develop a plan to address these areas with early screening and prevention.

HLIQ Whole Genome analysis report provides physicians and individuals with the most detailed exploration of the individual genome in the context of the tens of thousands of genomes in the HLI database, where more can be learned about one genome through its comparison with many.

While the ACMG 59 genes are what is clinically relevant currently, HLIQ Whole Genome puts your patients and their families in a position to be the first to benefit from new genomic-based research and therapy.

Q: WHAT DOES HLIQ WHOLE GENOME STUDY?

A: The HLIQ Whole Genome report includes both clinical, or medically actionable results, as well as other non-clinical information such as traits and ancestry. Briefly these categories include:

The ACMG 59 genes were identified by the American College of Medical Genetics as being not only highly penetrant, but also clinically actionable (a change in

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Analyzes

CLINICAL
ACMG 59
Carrier Status
Pharmacogenomics

HEALTH INSIGHTS
Cancer
Cardiovascular
Neurological
Respiratory
Metabolic and More

PERSONAL INSIGHTS
Ancestry
Allergy
Food Intolerances

TRAITS
Eye Color
Skin Color
Height

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treatment, management, or surveillance may significantly improve outcome). Identifying variants in these genes may warrant surveillance or treatment, and confirmatory or family testing may be important to consider. Most of these genes are associated with cancer or cardiac risks.

Q: WHAT ARE THE PERSONAL PRIVACY, GENETIC INFORMATION, AND LEGAL PROTECTIONS FOR INFORMED CONSENT OF WHOLE GENOME SEQUENCING?

CONSENT

- Required prior to ANY sample collected for genetic testing or molecular genetic analysis
- Consent laws created and enforced primarily at the state government level; federal regulations may apply in some situations (eg, stored tissue samples)
- Consent required even for population level analysis, employers, etc.
- Separate expressed consents required for research and also if personal health information is to be published in the scientific/medical literature

HIPAA

- Health Insurance Portability and Accountability Act (HIPAA) established privacy and security standards, including individual rights for health information
- Health Information Technology for Economic and Clinical Health Act (HITECH) strengthened HIPAA regarding criminal and civil penalties, breach notification, and enforcement

GINA

- Genetic Information Nondiscrimination Act (GINA) signed into law in 2008
- Enacted to protect individuals from misuse of genetic information by health insurance carriers and employers
- Designed to removed barriers to the appropriate use of genetic services by the public
- Some state laws also extend coverage to prohibit discrimination by one or more of the following: life insurance, disability, or long term care carriers, which are not covered in GINA.

Q: WILL HAVING MY PATIENT'S GENOME SEQUENCED INCREASE MY CLINICAL WORKLOAD?

A: Consistent with published studies (Dewey et al., Science 2016) approximately 3% of individuals who have their genome sequenced will have clinically significant variants for medically actionable conditions or diseases. The majority of individuals (about 97%) have unremarkable whole genome sequencing findings. So while there may be some additional work in helping to educate your patient about their whole genome, most will not have any clinical follow up as a direct result of their whole genome sequencing. You can expect 10-15% of patients will have therapy adjustments.

Q: HOW CAN A PHYSICIAN ACCESS THIS TEST?

A: HLI is currently distributing HLIQ Whole Genome through business partnerships. To learn more about how you can order your HLIQ Whole Genome pack, visit www.humanlongevity.com. Educational information for you and your patient will be included, as well as all necessary clinical components to collect and return the sample. HLIQ Whole Genome requires a blood draw.

Q: WHAT RESOURCES DOES HLI PROVIDE?

A: A guide to the HLIQ Whole Genome Report and genetic counselor resources

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Q: WHERE CAN I ACCESS THESE RESOURCES?

A: Please visit the HLIQ Whole Genome website.

Q: HOW DO I UNDERSTAND THE RESULTS?

A: A HLIQ Whole Genome Guide for Physicians will provide a basic guide to clinical genomics and specific information about the HLIQ Whole Genome Report including links to clinical guidelines that are medically actionable for the genomic findings.

Q: WILL MASSMUTUAL RECEIVE A COPY OF MY PATIENT'S REPORT?

A: No. MassMutual will not get any data back from this test. All data and reports are for use by you and your patient. Data can be shared only after permission is authorized by the patient.

Q: WHEN WILL I RECEIVE THE REPORT?

A: You will receive the HLIQ report in approximately 8 weeks from HLI's receipt of the blood sample and TRF.

Q: WHAT IS THE DIFFERENCE BETWEEN HLIQ WHOLE GENOME AND OTHER GENOMIC PRODUCTS?

A: The only way to identify all of the genomic variations in an individual's genome, including the common, rare and individually unique variations, is to use DNA sequencing to determine the exact sequencing of bases in the individual's genome.

HLIQ Whole Genome looks at all of your patient's DNA sequence. Other technologies, like those offered by 23andMe, only look at a limited set of known genes and variants. These genotyping panels use pre-specified and limited set of known genes and variants. With these tests, you can only get information on a small targeted set of DNA changes, or variants.

HLIQ Whole Genome is an unbiased analysis of an individual's DNA sequence without regard to any pre-specified limits. With this test, you can get information on a broad set variants across all your DNA and their associations with any known traits and disease risks.

As noted above, the benefit of whole genome sequencing versus other products is the opportunity to pick up relatively uncommon cases that fall through the cracks at other genomic providers for an insignificantly higher cost compared to the amount of data obtained.

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Q: ARE THERE ANY AGE RESTRICTIONS FOR THE HLIQ WHOLE GENOME?

A: In the U.S., only adults 18 years and older may receive results from this whole genome sequencing report. If you have a child that you would like to undergo genetic testing, please discuss this with their pediatrician, or a genetic counselor.

Q: CAN I ORDER FROM ANY STATE IN THE UNITED STATES?

A: The HLI is a CLIA-certified laboratory. HLIQ Whole Genome test is classified as Laboratory Developed Test (LDT). Currently, HLI can offer this test in all states, except New York state.

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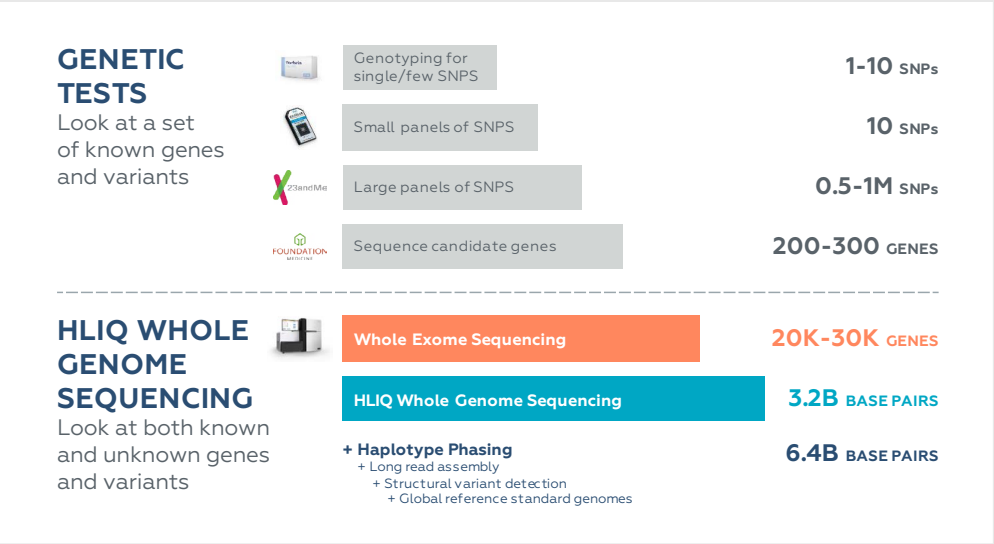

Q: WHAT IS THE PROCESS FOR ORDERING THE HLIQ WHOLE GENOME TEST?

A: Currently, the HLIQ Whole Genome test is only available to customers, financial professionals and employees of MassMutual Financial Group.

Q: HOW IS THE PRIVACY AND THIS DATA FOR MY PATIENT PROTECTED?

A: HLI is committed to protecting the privacy of its clients and to safeguarding identifiable health information. Once received by HLI, the samples are coded and devoid of name and birthday.

HLI will only provide the results of your test to your patient and you, unless your patient requests HLI to provide it to another healthcare provider. HLI will not provide the information to any employer, insurance providers, nor to any other healthcare provider without an explicit request.

HLI has also adopted a Privacy and Security Compliance Program to assure its compliance with Federal regulations and state law governing patient privacy and health information security. Below are examples, not a complete list, of measures in place:

- Data confidentiality is protected by limiting the security access to only those company users authorized to view and/or work the data.
- All HLI workforce members are trained to protect the privacy and security of protected health information or PHI and to follow the Program policies and procedures whenever they use, disclose, maintain, transmit, or access PHI.
- HLI promotes a culture of privacy and security awareness and ensures that clients are afforded specific rights and protections related to their medical information.
- HLI regularly schedules risk assessments of the vulnerabilities

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and threats to client information and implements reasonable and appropriate safeguards to mitigate such risks.

- HLI evaluates the effectiveness of the Program on an ongoing basis leveraging security best practice frameworks and works to modify policies and procedures from time to time, in light of technological, environmental, operational, and regulatory changes.

Q: CAN THE RESULTS OF THIS TEST IMPACT MY PATIENT'S EMPLOYMENT OR ABILITY TO OBTAIN HEALTH INSURANCE?

A: In the U.S., there is an act that protects you from genetic discrimination. The Genetic Information Nondiscrimination Act or GINA, is a federal law that protects you from genetic discrimination. GINA prohibits health insurance companies and employers from using your genetic information to make decisions regarding your insurance coverage and employment. For example, if you were determined to have an increased risk of developing dementia later in life, your employer and health insurance provider cannot terminate employment or deny you coverage based on this information.

However, there are a few caveats. The law does not apply for small employers of 15 or less people and some federal services. GINA also does not apply to life insurance, disability insurance, and long-term care insurance coverage.