



## Diagnostics

### Broad Definition

An area of industry which involves finding the cause and location of disease using laboratory tests, chemistry and imaging technologies. Most laboratory machine companies also fall into this category.

Examples of diagnostic types include hormone level tests, genetic testing, and AI-enabled diagnosis through radiology scans.

### Behaviors

- Diagnostics companies fall into three main types with new ones emerging frequently
  - *ML-Imaging Companies*: involve the use of machine learning algorithms on CT/XRay/MRI images to automatically characterize disease either with, or relying on, physician input
    - *Genomic Diagnostics*: involve the use of scientists and complex genomic algorithms to find DNA abnormalities and investigate genetic disease
    - *Molecular Diagnostics*: uses chemistry and biological reactions to categorize molecule/hormone/protein levels in the body
- ML-imaging companies act like software companies and are highly funded by Silicon Valley; however, most are highly-similar and face issues with data training and racial representation
  - Staffed with software engineers and radiologists
  - Mostly startups in this field; only a few companies are actually in hospitals
  - High investment by China/Chinese VC's
  - Differentiation based on which type of the body they can diagnose (i.e. heart vs lungs vs brain)
- Genetic/Genomic Diagnostics also act like software companies and are highly funded by both healthcare and software companies; there is a lot of innovation in this area, from personal testing to tissue and cancer genetics
  - Very diverse approaches
  - Staffed with software engineers, geneticists, bioinformatics, scientists
  - Some startups, some mid-sized companies

- Molecular diagnostics companies are dominated by Quest and LabCorp (large companies); there's less innovation in this field, as the most prevalent biomarkers have been characterized
- Large companies are very structured; smaller companies have more room for flexibility, but are generally quite focused vs synbio, pharma, etc.
- Laboratory machine companies often make the instruments that enable the diagnostics to happen
  - Most of these are large companies that have multiple types of equipment ○ These function like medtech companies but have more people running assays using instruments for testing, fixing the instruments, and providing training for scientists/doctors

### Types of Roles Available

- Highly dependent on type of diagnostic company
- Lab Machines: Machine Specialists, Manufacturing, Quality, Testers, Product Development, Engineering, plus typical corporate roles
- Molecular Diagnostics: Lab Specialists to run the experiments, Clinicians to do the work that needs to be certified, plus typical corporate roles
- Genetic/Genomic Diagnostics: Software Engineers, Data Scientists, Computational Geneticists, Bioinformaticians, Genetic Counselors; typical startup roles; less of an emphasis on QA/manufacturing because all software platforms
- ML-imaging companies: same as genetic/genomics, except often include MD's that are radiologists instead of genetic counselors/geneticists (non-MD)

### Valued Skills

- Data analytics
- Organization
- Efficiency

### Relevant Companies

<i>Diagnostics</i>	<i>Diagnostics Machines</i>
Quest Diagnostics	ThermoFisher Scientific
PathAI	Agilent Technologies
LabCorp	Bio-Rad

Parabase Genomics	PerkinElmer
Cologuard	
Grail	<i>Diagnostics Cont.</i>
Cofactor Genomics	Athelas

Freenome	23andMe
Hologic	Arterys

**To Follow/Join:**

- Biospace Diagnostics: special area of news for diagnostics industry
- Sequoia Capital: Top VC company, invests in digital health and some biotech, has made some diagnostics investments
- Y-Combinator: Their biology portfolio has a couple of diagnostic companies
- AngelList: For computation-heavy companies, mainly ML and genomics, this is a great place to find jobs

**Relevant Majors:** MB&B, MCDB, Chemistry, MechE