



2023 Diagnostics Trends



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Diagnostic testing is essential for almost all life sciences operations, as its implications range from medical device manufacturing, to patient care and reporting, to laboratory operations. The trends in diagnostics follow these applications with a contemporary emphasis on data and the end-user experience through connection to the Internet of Things. In such a mature market, innovations and operational excellence will be a necessity for growth with players in this industry.

Below we outline four key trends in the diagnostics industry for 2023:



WEARABLE TECHNOLOGY FOR REAL-TIME DIAGNOSTICS



INCREASED CONSUMER DESIRE FOR AT-HOME DIAGNOSTICS



INTEGRATING ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING INTO LAB DIAGNOSTICS



LEVERAGING EPIGENETIC TESTING FOR DIAGNOSTICS AND PERSONALIZED MEDICINE



DEVELOPMENT OF DRUG PRODUCT THERAPIES INFLUENCED BY DIAGNOSTICS



WEARABLE TECHNOLOGY FOR REAL-TIME DIAGNOSTICS

Driven by the increased expectations for convenience, ease of mind, and value-added technology of consumers today, there has been a substantial rise in the use of wearable technologies. These devices can provide tremendous amounts of valuable, real-time data on user health and activity. Instead of capturing a snapshot of a consumer's health through blood samples from a lab or after visiting a healthcare professional for a diagnostic exam, wearable technology – like an Apple Watch or a Fitbit – provides continuous recording of health metrics that allow for pattern recognition in detecting health risks and alerting users on unusual health scenarios without delay. Another example would be the [Omron HeartGuide](#), the first smartwatch to receive FDA approval for blood pressure monitoring capabilities, which holds readings that can be reviewed in a mobile app and shared with the user's physician for insight, treatment, and next steps.

Wearable technology is also being used in hospitals to provide patient deterioration detection; the [Philips wearable biosensor](#) is a five-day disposable patch that adheres to the skin to track vital signs indicative of patient deterioration, especially for those patients moving from ICUs to lower acuity areas in a hospital. This provides the ability to detect early warning signs and contextual recovery indicators like movement and ambulation.

Since consumers value their connection to the Internet of Things (IoT), having a device that not only acts as an augment to a smartphone, article of clothing, or fitness tracker, but can also collect and monitor health data that provides considerable quality of life improvements is extremely appealing. With the forecasted number of connected wearable devices set to [eclipse one billion in 2022](#), this market demand is also reflective of consumers' increased desire to take control of their own personal [health and well-being](#).

Wearable technologies are expected to have a 13.8% CAGR with revenue to surpass \$118.6 billion by 2028.

SOURCE



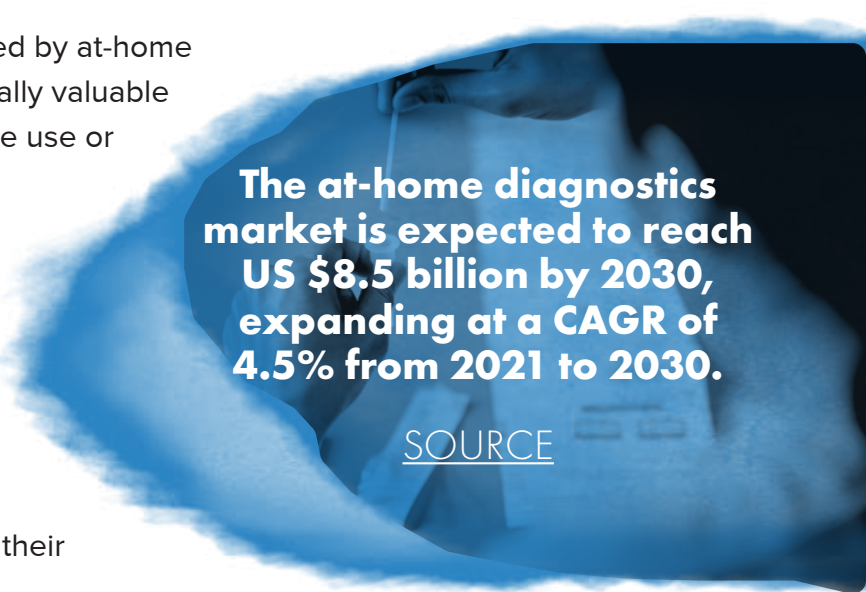
INCREASED CONSUMER DESIRE FOR AT-HOME DIAGNOSTICS

Instigated by the necessity for at-home tests for COVID-19 during the pandemic, consumers have shown that they have the ability and desire to diagnose themselves from the safety and convenience of their own homes. Compared to sending samples to a lab, at-home diagnostics can provide consumers with access to quicker results in a more cost-effective manner.

At-home test kits for COVID-19 allowed non-healthcare personnel to administer a diagnostic exam to themselves, at any time, with the added value of avoiding transmission of disease at a testing site or in transit. Of course, at-home diagnostic tests are available for more than just COVID-19 detection, and that demand continues to grow. Everlywell, a company that sells at-home tests for everything from Lyme disease to fertility, said the company experienced [over 100% growth](#) in 2021 compared to 2020.

Consumers also value the privacy granted by at-home diagnostics, confidentiality being especially valuable in sensitive tests, like those for substance use or involving sexually transmitted diseases.

At-home diagnostics provide an avenue for consumers to take their health into their own hands, on their own time. As consumers become increasingly acclimated to the benefits of at-home testing, they will expect diagnostics to continue to be tailored to their lifestyle going forward.

A person is shown using a handheld diagnostic device, possibly a blood glucose meter or a similar point-of-care device. The image is overlaid with a blue circular graphic containing text.

The at-home diagnostics market is expected to reach US \$8.5 billion by 2030, expanding at a CAGR of 4.5% from 2021 to 2030.

[SOURCE](#)

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INTEGRATING ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING INTO LAB DIAGNOSTICS

With strengthened access to data, diagnostic labs across the world are implementing Artificial Intelligence (AI) and Machine Learning (ML) capabilities into their systems for faster, more accurate and streamlined applications.

There are many reasons why companies would want to integrate AI and/or ML in their diagnostic lab operations. Labs today can achieve more efficient operations by utilizing robotic process automation (RPA) to allow lab techs the ability to administer and run more tests at once, increasing productivity per worker.

[Leveraging](#) the strength of ML capabilities – namely image and pattern recognition – promotes accurate diagnoses at significantly reduced times. AI algorithms can be implemented to query siloed or unstructured data repositories, improving the overall foundation of a laboratory's data integration. Furthermore, advanced Deep Learning (DL) tools have changed the landscape of possibilities for lab predictions, displaying outstanding classification results. For example, DL algorithms boasted Area-Under-ROC Curve (AUC) scores reaching [.937 in Lung Nodule classification](#), meaning correct classification of lung nodules 93.7% of the time. AI voice recognition, like [LabVANTAGE's LOTTIE](#), a LIMS-integrated digital assistant, allows lab techs to

execute commands and access query information through Natural Language Processing.

Simply, labs that aren't considering integration of their Laboratory Information Management Systems (LIMS) with data-enabled AI and ML for diagnostics will fail to stay competitive against those using faster, more accurate and cost-effective operations.



LEVERAGING EPIGENETIC TESTING FOR DIAGNOSTICS AND PERSONALIZED MEDICINE

Epigenetics are markers on cells that can indicate the presence of disease in a faster manner, as well as determine the rate of progression in some. While epigenetics don't change the sequence of DNA, they show up as indicators of these changes. Commonly, they are looked at to pick up early signs of some forms of cancer, like melanoma or prostate cancer. Predictive tools utilizing epigenetics can be used to validate the results of negative diagnoses for cancers and reduce the necessity for successive testing. They also address the likelihood of recurring cancers after regression, improving the safety of patients.

Epigenetics also plays a role in diagnosing mental wellness, not just physical. Gene expression plays a significant role in behavior, and scientists are looking at how certain neurogenetics can be influenced by the environment or development, and how these lead to the expression of addiction and depression. Understanding these influences could lead to better prediction and prevention of poor mental health, an issue at the forefront of American culture [today](#).

Because these gene indicators are also key in understanding how a patient will respond to a treatment, pharmacogenetics – the study of how a person's genes will affect their response to medication – can be paramount in the development of personalized medicine.

The collection of individual epigenetics and DNA sequencing is aided by the increased popularity of personal genomics. The increased focus on health in the public eye has made personal genomics increasingly important to consumers and how they want to be treated. The Direct-to-Consumer Genetic Testing (DTCGT) market [passed \\$1.4 billion in 2021](#) and is at an all-time high. DTCGT can provide the user with polygenic risk scores, which describe genetic risk for an assortment of diseases, allowing consumers to achieve preventative diagnostic testing without taking time from their daily tasks.

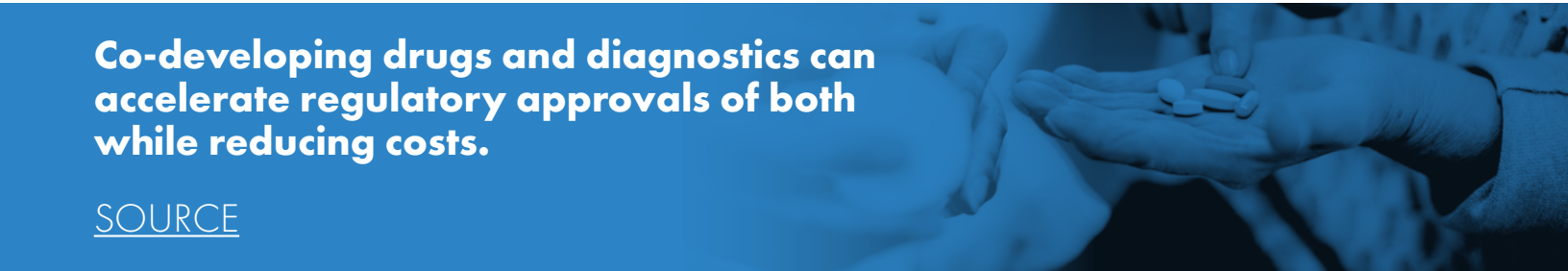
With an increase in data of DNA to conduct research, epigenetic testing becomes more capable and returns value to consumers by making personalized medicine effective and available.



DEVELOPMENT OF DRUG PRODUCT THERAPIES INFLUENCED BY DIAGNOSTICS

[Today](#), pharma companies are less likely to develop their own companion diagnostics to go alongside a drug. Instead, they are likely to opt into a partnership with a diagnostic company. There [are many added benefits of a partnership like this](#); they leverage specialization to deliver higher quality and efficiency in the development of the necessary diagnostics to accompany drug therapies, and they also provide legal separation for regulatory purposes.

This trend has been on the rise in part due to the increased research and development of personalized medicines and treatments noted in the previous trend. As drug companies continue to strive to develop therapies that will be maximally effective for each individual patient, Molecular diagnostics become increasingly more in demand and are expected to have a [revenue CAGR of 12.4% over the next decade](#). Due to this increased demand, and the benefits of partnering with an [outside diagnostic company](#) over continuing in-house diagnostic development, drug product therapies are expected to increase in their co-development with diagnostic companies rather than designing a single diagnostic beforehand or creating them in the late stages of drug production.



Co-developing drugs and diagnostics can accelerate regulatory approvals of both while reducing costs.

[SOURCE](#)

CONCLUSION

These 2023 diagnostic industry trends are driven by consumer expectations for personalized, value-added, and accurate tests, but are supported by strong data collection and intelligence integration. Many of these trends build upon another – the data collection of real-time diagnostics and at-home testing provide valuable training sets for AI classification and prediction models. The desire for personal genomics leads to consumers providing greater numbers of DNA samples for testing and research to improve the understanding of epigenetics. In turn, these samples also provide data for Deep Learning algorithms to provide better insight into the human body.

Scientific advancements in diagnostics have exploded since the 2020 pandemic, but in 2023, consumers expect those innovations to be the status quo, and those expectations are driving an industry shift in the development of drug therapies.

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