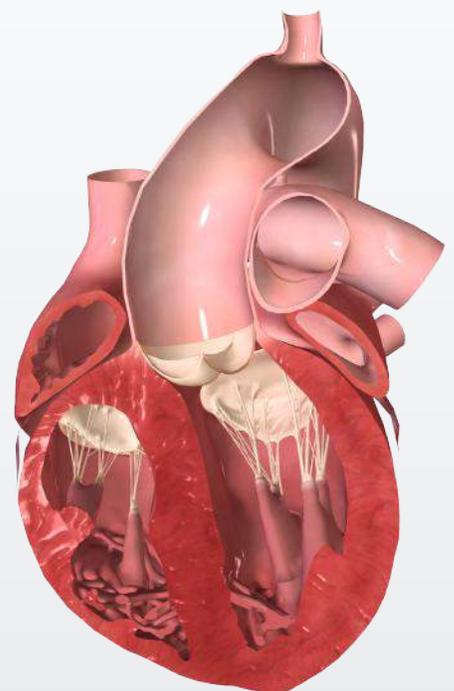




 **BIODIGITAL**

How a leading health system enhanced patient education with interactive 3D





About the Customer

Mass General Brigham (MGB) is an integrated health system in the New England area comprised of two top-tier academic medical centers, community hospitals, a rehabilitation network, and many locations for urgent and community care. Its Primary Care Office InSite (PCOI) is a digital resource library for primary care providers — physicians, residents, nurse practitioners, and physician assistants — as well as specialists from urgent care, orthopedics, and other departments. **PCOI** is a web-based, decision-support tool that facilitates day-to-day practice for primary care teams. The site hosts clinical guidelines, patient handouts, medical calculators, clinic visit tools, referral information, and more, alleviating the burden of finding these resources across disparate sources.



Industry:

Primary and specialty healthcare

Locations:

16 entities across the health care continuum

Servicing:

1.5 million patients annually

Key Challenges



Patients struggled to visualize and understand their health conditions and treatments.



Clinicians faced difficulties educating patients without easy-to-access visualizations or interactive models.



PCOI needed to drive a more efficient workflow for providers and include better tools to explain anatomy, disease, and treatment to patients.



Solution

BioDigital's interactive 3D models help patients understand how the body operates, visualize disease progression, and envision treatment options. By integrating the BioDigital Human into PCOI, clinicians **save time by easily accessing 3D models** of anatomy, health conditions, and treatments directly within the resource library. This supports the provider-patient conversation within the workflow, enabling clinicians to customize patient education quickly and raise patients' health literacy so they can be more engaged in their health and achieve better health outcomes.



Bridging the Gap

BioDigital helps bridge the gap between clinical knowledge and patient understanding.

BioDigital allows clinicians to improve patients' foundational understanding of anatomy and health conditions with an innovative approach that gives patients confidence.

BioDigital complements the existing library of patient education and clinical resources.

Background:

A Crucial Primary Care Resource

PCOI is owned and supported by Massachusetts General Hospital and is accessible throughout Mass General Brigham. This digital resource library has been serving the needs of primary care providers at the point of care for almost 25 years.

Mass General Brigham's PCOI Includes:

-  Patient care guidelines on a wide range of topics
-  Clinical tools to use within a patient encounter
-  Medical calculators
-  Convenient links to both local resources and clinical sites such as UptoDate® and the Centers for Disease Control and Prevention (CDC)
-  Patient education handouts
-  Pharmacy and drug information
-  Commonly used forms and workflow support, including referral information across institutions

PCOI was developed to curate all the necessary information clinicians need in one convenient, organized, virtual space. Annually, there are **8,000–9,000 active PCOI users** within MGB and its affiliated practices.

While PCOI is a provider-focused library, many of the resources are designed to be incorporated into routine patient care activities. [Julie Martin](#), PCOI Medical Editor, explains, “Most guidelines housed within PCOI link to one or more of our patient handouts. When a clinician is looking at a guideline, he or she can view the accompanying handout and then easily send it to a patient through the patient portal.”

“PCOI is designed to support decision-making and care of patients through the Primary Care ‘lens,’ with curated guidelines and patient information that empowers patients to partner with their clinicians in their care,” Dr. Celeste Robb-Nicholson, PCOI Medical Director.

This level of interconnectivity not only ensures clinicians are accessing the most up-to-date clinical information, but also drives better health outcomes by ensuring patients are fully informed and engaged with their healthcare teams.

“Our goal with PCOI is to pull all the information a clinician would need to take care of patients in one easily accessible site to assist in the delivery of more efficient, higher quality care.”



Dr. Shana Birnbaum
Lead Faculty Editor of PCOI &
Internal Medicine Physician

The Opportunity: Expanding Beyond Text To Enhance Patient Health Literacy

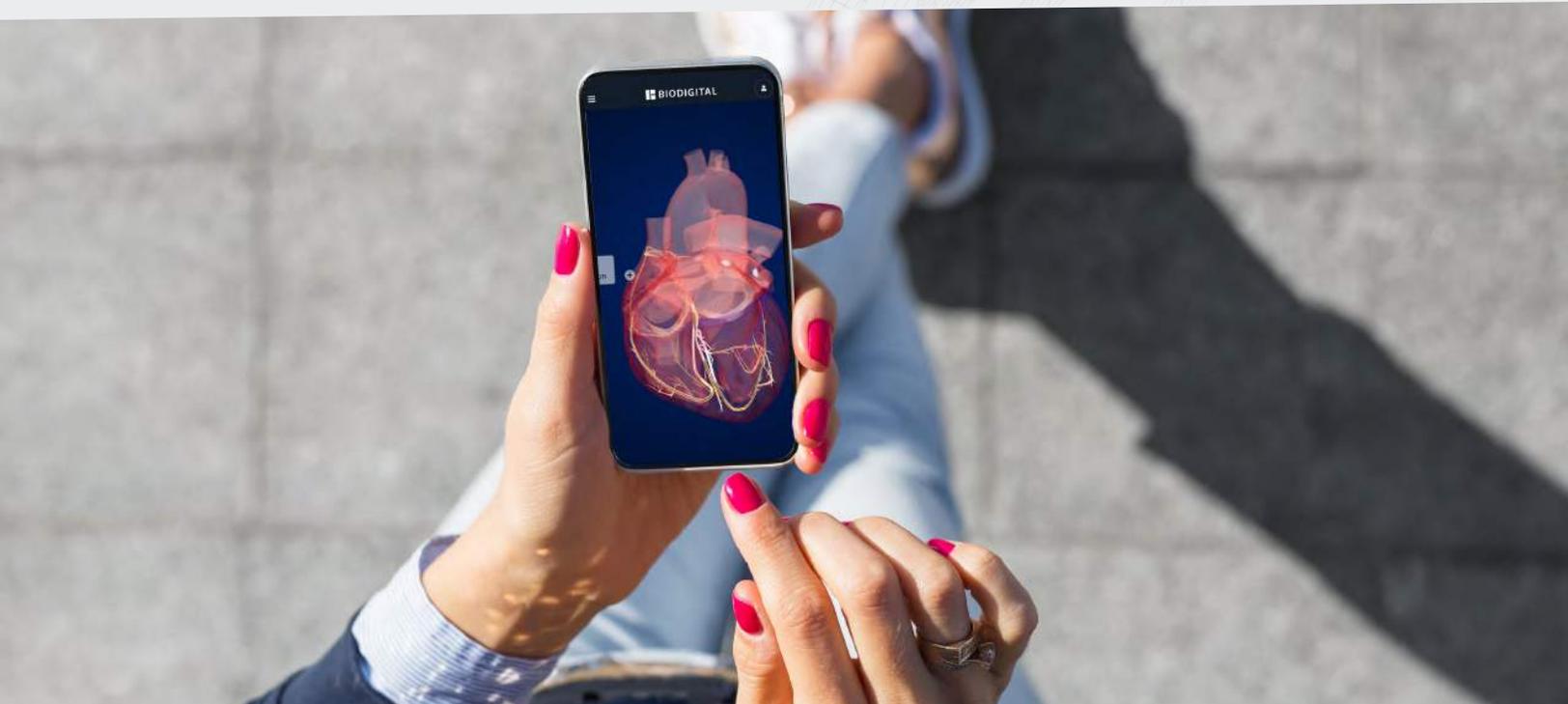
While PCOI was truly an invaluable resource for clinicians, the PCOI team saw a need to add better ways to explain anatomy, disease, and treatment to patients.

Visuals — including pictures, charts, graphs, and diagrams — can all be **effective tools** in communicating health information to patients, particularly for patients with lower health literacy. Unfortunately, except for 2D images, PCOI had no visual models to aid in patient education.

This led to complicated workarounds. For example, in the case of a patient with heart failure, Dr. Birnbaum shared the story of a patient who did not understand his diagnosis and the urgent need for him to undergo diagnostic cardiac catheterization. Without a model or artistic rendering, Dr. Birnbaum would have had to rely upon her own artistic skills.

In the past, she would draw a rudimentary heart on the back of a scrap of paper, manually demonstrating how the heart pumps. She would attempt to draw coronary blood vessels — which are difficult to draw to scale — in order to visually highlight how a blockage could be detrimental to the patient's heart health.

And so much of what occurs in the body is dynamic. For example, it is impossible to draw a fibrillating atrium to show both how fibrillation impedes pumping of the heart and fosters formation of a clot. Showing that dynamic image to a patient really improves their understanding of the treatment they need — medicines to control the heart rate and anticoagulants to prevent clot.



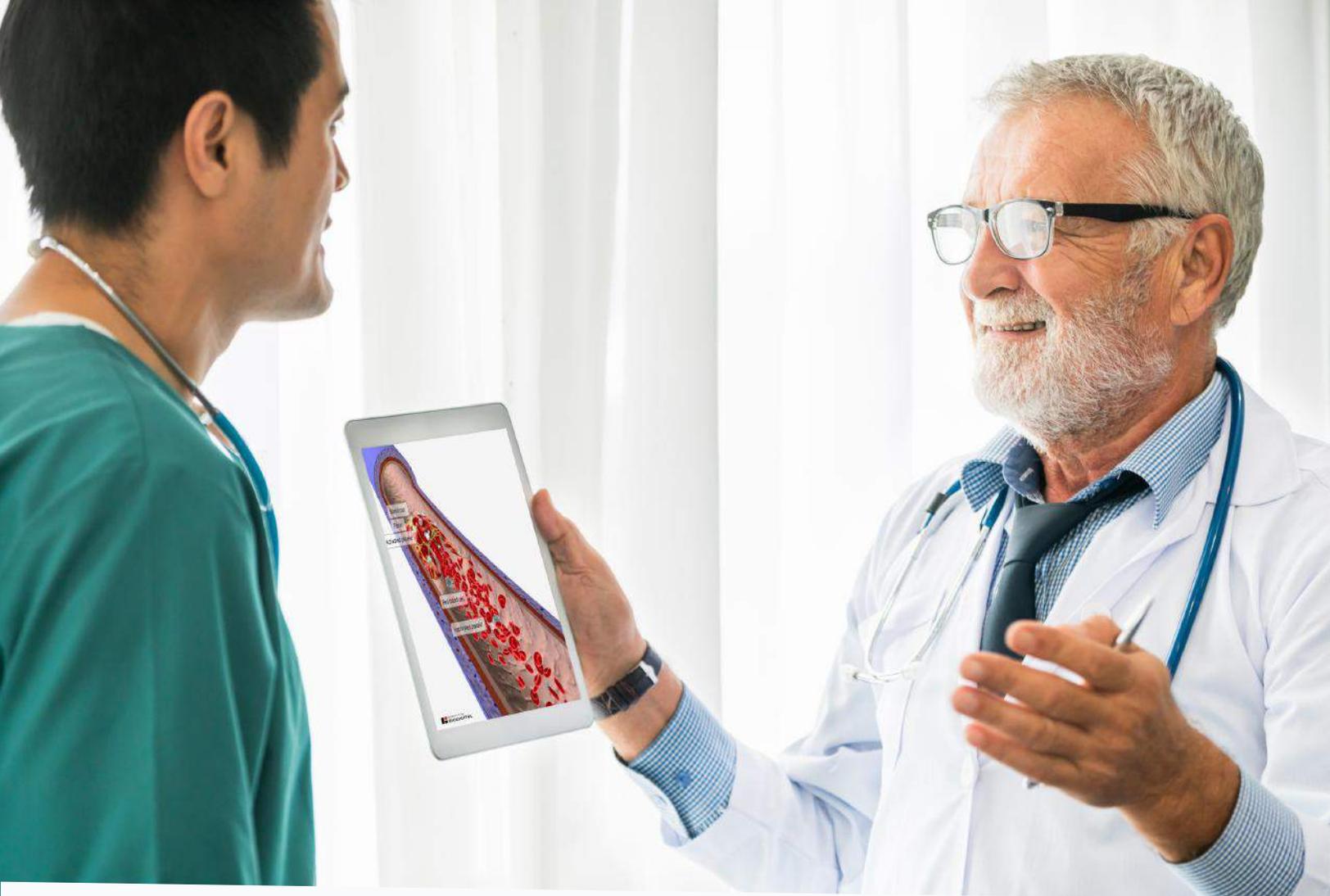
The Starting Point: Creative Problem-Solving, Fragmented Approaches

Before the integration of BioDigital into PCOI, Dr. Birnbaum suspects that she was not the only Mass General Brigham clinician sketching on the back of envelopes, discarded notes, and printer paper when trying to visually convey complicated medical information to patients. There simply was **no single source from which to reliably obtain high-quality visuals** at Mass General Brigham. Instead, it was a laborious process of searching through PCOI clinical guidelines, patient handouts, external guidelines, or even Google to locate suitable images to share with patients.

Back in the day, Julie shares, the team partnered with medical illustrators to develop images on a case-by-case basis. At times, the PCOI team would conduct an image search on the web to identify workable visuals, but then encounter difficulty obtaining proper permissions to share and disseminate the images through PCOI. These drawings did not share a standardized look or color story, and they weren't used consistently across resources.

These visuals were all two-dimensional, meaning they did not support interactivity and weren't easily customizable to meet a wide range of patient learning needs. Although some 3D physical models and medical posters were available in the clinical setting, they were not widely available, and rarely used beyond the purpose of teaching medical residents. Primary care is comprehensive care for the entire human body; making it difficult or impossible to have a full range of physical models available in every patient care location.





The Goal: Integrate 3D Interactive to Level Up Patient Education

It was clear that there was a need to better explain anatomy, physical ailments, and disease progression to patients. Before they were introduced to BioDigital, the PCOI team was not aware that a virtual, interactive, 3D model existed. Nevertheless, they understood that having access to a wide array of high-quality, well-designed visuals could improve the patient-provider experience.

To make PCOI even more valuable, it was critical to develop visual experiences that engage patients in their healthcare plan — while ensuring that the burden of finding those visuals was not placed upon clinicians at the point of care.

They needed a solution that worked across all elements of clinical care with the goal of helping patients become informed decision-makers by truly understanding their medical issues and what different procedures might entail. And, with the easily navigable PCOI already saving clinicians up to 30 minutes a day, they needed to ensure that the solution preserved that time savings.

The Solution:

Simplifying Complex Medicine, Saving Time

BioDigital is now used as an interactive communication tool between patients and Mass General Brigham clinicians. There are three ways in which BioDigital has been implemented:

1 BioDigital increases patient engagement in the clinical office setting.

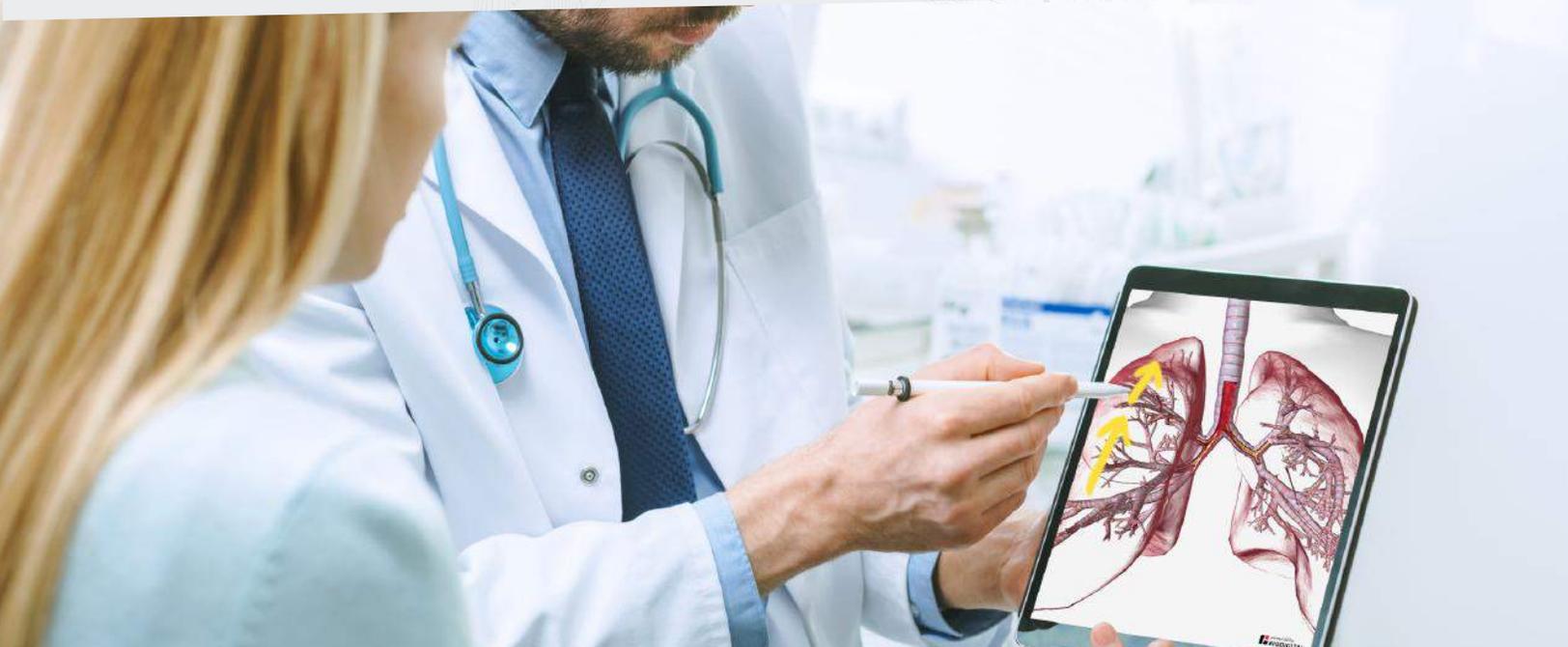
When clinicians are addressing patients in the office, they typically have Epic, the electronic health record (EHR) system, open on one screen and PCOI open on another. Mass General Brigham's BioDigital visualizations are included throughout PCOI.

This means, at any time, clinicians are just one click away from being able to open up an embedded, digital, 3D, anatomical model and guide the patient through a tour of the human body. Patients can be engaged through a comprehensive, scientific demonstration of disease, treatment, and procedures — directly within the portal Mass General Brigham clinicians already use every day, in every patient session.

2 BioDigital is used to relay complicated medical information virtually with patients via telehealth.

The impact of the COVID-19 pandemic on healthcare delivery cannot be overstated. With its transition to virtual care, Mass General Brigham is now adding BioDigital into telehealth visits.

At any time, a clinician can bring a 3D model of the human body into the patient consultation. With the BioDigital Human, they can rotate the model, zoom in, freeze frames, annotate, or label images to align with the patient's unique diagnosis or treatment plan.





3 BioDigital is used to provide guidance to medical residents.

Mass General Brigham medical residents are also using BioDigital as a tool to enhance patient interactions. “I can teach them how to teach their patients,” Dr. Birnbaum explains, “and for that, BioDigital is incredibly helpful.”

BioDigital allows residents to become patient-focused communicators in many ways, such as using layperson’s terms instead of medical terminology, slowing down their explanations of anatomy, and using visual guides to increase patients’ health literacy.

All in all, “BioDigital makes the abstract tangible,” says Julie. “It heightens patients’ understanding of medical terms, conditions, and processes, and it enables residents to communicate at the patient’s level.”

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Julie J. Martin, MS
PCOI Medical Editor

The Results:

Raising Health Literacy

Let's revisit the case of the patient with heart failure who needed a cardiac cath. Instead of taking time to sketch a heart and attempt to explain how blood flows through the chambers of the heart, Dr. Birnbaum simply navigated to the PCOI resource library and opened the BioDigital 3D heart failure visual.

The virtual tour demonstrated how the heart pumps, allowing Dr. Birnbaum to easily show the consequences of a heart that is not functioning as it should. After being shown a coronary artery blockage on the model, the patient replied, "Wow, a picture is really worth a thousand words," and agreed to admission for a heart catheterization.

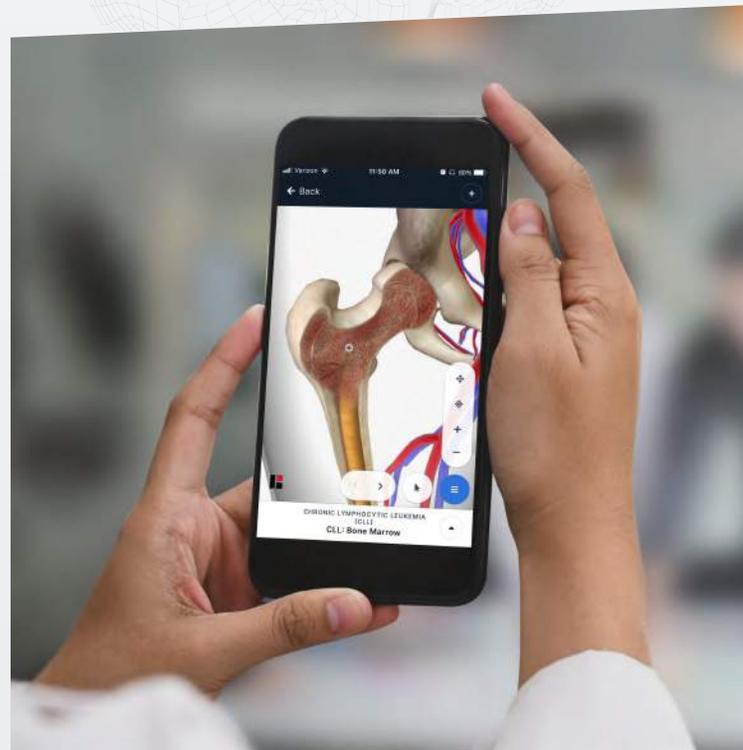
"It helps us raise a patient's health literacy to a point where they have enough understanding and confidence to make appropriate decisions for their health."

Dr. Shana Birnbaum
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Although they began implementing BioDigital in 2020, the COVID-19 pandemic put the project on hold while Mass General Brigham worked to adapt to the new reality of healthcare. Now, the PCOI team is designing innovative ways to further use BioDigital 3D visualizations to modernize patient education and continue building out PCOI as a robust point-of-care resource.

Already, BioDigital is helping bridge the gap between patient understanding and provider-level clinical knowledge. **"BioDigital visualizations help patients get to where we, as providers, would like them to be,"** says Dr. Birnbaum. "It helps us raise a patient's health literacy to a point where they have enough understanding and confidence to make appropriate decisions for their health."

These 3D models are useful across the health literacy spectrum. Simpler visuals can be used for those lower on the scale, while highly literate patients benefit from models that use layering, fading, interactive labeling, and other effects to understand spatial relationships and interconnected systems.





How are other Mass General Brigham clinicians reacting to BioDigital?

They're blown away by the features and real-world applications. Plus, because the 3D visualizations are already housed within PCOI, they're jumping on the opportunity to integrate the models into patient care.

Instead of searching the internet for visuals that may or may not be effective communication tools, **clinicians are quickly able to find the tools they need, increasing the effectiveness and efficiency of their patient interactions.** BioDigital also supports self-directed learning by enabling clinicians to view and interact with realistic virtual tours and models — an easier way to find answers to their pressing questions.

What does the future hold?

The PCOI team hopes to integrate BioDigital into Epic's patient portal and include them within appropriate clinical guidelines, patient handouts, and other text-based resources within PCOI.

As the team becomes more comfortable using BioDigital with patients, they can already see how a visual will be an added benefit to many patient encounters, increase efficiency, and continue making PCOI even more of a time-saving resource.

Empowering Provider-Patient Engagement

Clinicians today are not only delivering patient-centered care, but also adapting their care to be delivered via telehealth. They have to simplify complicated medical concepts for patients in a short time frame, as well as increase patient engagement.

It's a big ask, but BioDigital is up to the challenge. The BioDigital Human is your partner in patient education. It empowers healthcare teams to add transparency for patients with interactive, anatomical 3D visualizations – and it empowers patients with the knowledge they need to make important health decisions.

Simultaneously, with its embeddable models, BioDigital becomes a go-to resource for healthcare teams. It aligns with healthcare teams' daily activities and is easily accessible wherever clinicians go for clinical information online.



See for yourself how the BioDigital Human
can enhance your patient education.

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