

Precision and performance under pressure

How Vivid™ Pioneer powers confidence in complex structural heart interventions

Thanks to breakthroughs in transcatheter therapies, cardiac patients once thought untreatable can now receive life-saving care. As the number and complexity of these interventional procedures continue to grow, so does the demand for clear, immediate, and precise imaging. At the core of it all is cardiovascular ultrasound — foundational for dependable planning and confident intraprocedural guidance.





For the team at Hospital Clínic de Barcelona in Spain, today's innovations must provide real-time answers in a dynamic, real-world setting. It's not enough to be right — echocardiographers also need to be fast. From high-stakes interventions to the seemingly routine, Professor Marta Sitges and Dr. Laura Sanchis emphasize the ongoing importance of tools that deliver both accuracy and speed.

The innovation mindset is deeply rooted in their hospital's emphasis on clinical research and its role as a testing site for new technologies.

The Cardiovascular Institute at Hospital Clínic serves as a tertiary care center for all types of cardiovascular diseases for a 2-million-inhabitant population and as a national referral center for heart transplantation, mitral valve repair, pulmonary hypertension, inherited heart disease, and adult congenital heart disease. The department manages more than 40,000 patient visits and performs 1,400 vascular surgery interventions, 900 cardiac surgeries and 2,900 percutaneous procedures annually — including TAVI, mitral, and tricuspid valve repair. Echocardiography is a cornerstone of care, with an estimated 19,000 echo exams performed each year.

The team at Hospital Clínic was among the first to explore the capabilities of the new Vivid Pioneer ultrasound system. We joined Professor Sitges and Dr. Sanchis for a busy day of cases to see the ultrasound system in action — and hear how it's impacting their clinical care.

How does working in a high-pressure cath lab setting shape your workflow and imaging needs?

Prof. Sitges: Having higher precision and higher image quality gives you more details about cardiac anatomy and function, which is crucial in the cath lab. We need that level of detail because this is a very dynamic process. We might have a perfect idea of what's going on from the initial echo, but once we're in the cath lab, everything can change. We are working on a living heart, so we really need to understand all the details — and what's happening at every moment.

The other important thing is that we need those details fast. In the echo lab, you can be very precise — getting great images with post-processing, but that can take 10 minutes. In the cath lab, you have 10 seconds. The interventionalist needs immediate answers.

Dr. Sanchis: It's very important for our patients that we are efficient — especially in the cath lab, where you need to quickly change views to locate a device or wire. It's essential we can achieve all the images we want very fast without post-processing — just live.

Given the demands of interventional cardiology — especially around precision and speed — what were your initial thoughts on Vivid Pioneer?

Prof. Sitges: Our first impression was, 'Wow, this is even better than the Vivid E95.' Vivid Pioneer is a step further in improving image quality and gaining speed — with faster, easier tools, and a more user-friendly interface. We were also happy to have this high-quality image in a compact system that was easier to move.

Dr. Sanchis: For me, Vivid Pioneer has higher image quality and faster tools. There are enhancements — the 2D and 4D are nice, and the Color is better — but the main difference is improved imaging with the FlexiSlice tool (MPR).

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Prof. Sitges: I also think with Vivid Pioneer, we gain a lot of simplicity in the workflow, without sacrificing the tools, robustness, or precision of the system. So, it's getting simpler, but with the very high standards of image quality and very supportive tools for the cath lab. It's really focused on making the user's life much easier.

Building on what you've already shared, what are your thoughts on the overall image quality and the 6VT-D probe?

Prof. Sitges: We were used to very good image quality with the Vivid E95 system and we were really happy to see that this was even better. I was astonished when I could see the precision on some images — the different parts of some devices in the cath lab. So there was really precise imaging, which I had never seen before.

We were really impressed by the detailed and precise imaging of the 6VT-D probe, especially during complex structural heart cases. For example, in several edge-to-edge repair cases and tricuspid valve replacement procedures



— where precision is critical — we really need to clearly see the valve leaflets. Sometimes that’s challenging, but with the 6VT-D, the imaging was very precise. What was more astonishing was the ability to clearly distinguish the different parts of the delivery system, which is crucial for some complex procedures like tricuspid valve replacement and annuloplasty.

We performed a tricuspid annuloplasty procedure where we could perfectly distinguish the differences between the guiding catheter, the spool, and other parts of the device — to ensure the procedure was fast, fluid, and ultimately successful. The main challenge of this procedure is placing different anchors in the annulus of the tricuspid valve. With Vivid Pioneer, there was a significant step forward in evaluating the different parts of the device. It was good with Vivid E95, but this was much better. Vivid Pioneer is really a step further and something we haven’t seen before — so really a breakthrough.

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Dr. Sanchis: With Vivid Pioneer, we can really have a very nice understanding of the anatomy. You can be very precise looking at the subvalvular apparatus for example. Whether there is indentation, endocarditis, or a hole, now it’s something that you can understand from the very beginning of the echo. Now you can see it, so it’s great.

With the 6VT-D probe, the 2D visualization and the 4D are very good. With 4D Color, you can see the location of the jets precisely. You can also use FlexiSlice in real-time and you don’t have to worry about the probe overheating. I think it’s very important that you don’t need to stop using the probe or freeze the image to reduce the temperature of the probe, and the quality of the imaging stays reliable during the entire intervention. So, I think the imaging has improved a lot, especially 2D and FlexiSlice.

I’d also point out that visualizing heart valves in echocardiography can sometimes be challenging, especially the tricuspid valve, due to its location in the far field. With the new tools, we now have improved visualization of this area.

How would you describe the improvements in Color Flow with Vivid Pioneer? What stood out most to you during your cases?

Dr. Sanchis: The Color in 2D is better than the Vivid E95. With Vivid Pioneer, you can see the jets better and you don’t see any splash, so I really like the changes in the color. The 4D is better now than the Vivid E95 and also the 4D Color is quite precise when you put it in 4D. You can really narrow the areas of the regurgitant jet and the orifice, so I think the visualization of the jets is especially nice. I really like that you can isolate the color indicating flow toward or away from you because you can see the complete jet, especially when they are eccentric.

Prof. Sitges: Color Flow is better than before because we have a denser image of the flow, and now 4D Color Flow offers high-quality imaging combined with a higher frame rate than before. I think this is another step forward in the visualization of residual leaks.

We also have the new feature Radiantflow.™ The image looks gorgeous, but we still need to figure out the overall benefits of this type of rendering. It seems promising to distinguish concomitant flows or close flows like mitral and aortic in the outflow. For example, in patients where you have concomitant flows, like in the case of LVOT obstruction, and you have two close flows. I think that it will also be helpful on residual leaks, but we need more experience.



How would you describe your experience with our new feature Silhouette?

Dr. Sanchis: Silhouette is a new feature we started playing with and I think the main use may be in visualizing the morphology of the appendage. It’s not so important to see the distal part, but sometimes you need to determine the anatomical classification of the appendage, or you want to understand a bit more about what you’re seeing in monoplane. And for that, I think it’s quite useful.

You mentioned improvements to FlexiSlice — Vivid Pioneer’s multiplanar reconstruction tool. How has it made a difference in interventions?

Prof. Sitges: FlexiSlice is becoming an essential tool in the cath lab. Currently we are performing more and more complex procedures in structural heart interventions, and we need to align and visualize structures that we are not used

to. Examples include using devices for annuloplasty or transcatheter valve replacement where it’s critical to see the engagement of all leaflets — or even simple edge-to-edge repair when there’s distortion of the heart’s anatomy and it’s not aligned with the scanning ultrasound beam.

Also, because the image quality of FlexiSlice has improved so much, guiding the procedure is easier for us because everything is in one shot — the 4D enface view, the short axis, the long intercommissural view, and the LVOT, for example, in mitral valve repair. So we have everything on one screen and we can all speak the same language.

Dr. Sanchis: FlexiSlice is extremely helpful for visualizing the valve’s surroundings and for achieving precise positioning within the valve. This allows us to work with 4D and the different planes at the same time for the right placement. It’s something we need to do very fast and it needs to be

reliable. The Vivid E95 version was fast, but with Vivid Pioneer there is a difference in image quality so some procedures can be performed faster. For me, this is the biggest step forward with the new system.

I think this can also help for communication with interventionalists because they can have 4D and the biplanes at the same time. They can have all the information together, so it’s now very easy with 4D to know the catheter position and movement.

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While FlexiSlice is something that most people are not using — especially during live interventions — I would recommend trying it because it's easier than it looks. It's something you can start applying offline at the beginning and then try during interventions. Several years ago, it was quite difficult to understand, but now the learning curve is easier, and it's becoming simple to use in everyday practice.

“2-Click Align is another tool that helps us perform really fast alignment during FlexiSlice. You can follow the catheter or any structure you want, and with just two clicks, all the views in FlexiSlice align concomitantly. It's super fast and makes your life easier as a user.”

When it comes to performance and productivity, what are some other features that could help improve efficiencies during procedures?

Prof. Sitges: 2-Click Align is another tool that helps us perform really fast alignment during FlexiSlice. You can follow the catheter or any structure you want, and with just two clicks, all the views in FlexiSlice align concomitantly. It's super fast and makes your life easier as a user.

The TSP tool — the transeptal puncture tool — also allows us to automatically measure the height of the transeptal puncture, which is crucial in many procedures, particularly in edge-to-edge mitral valve repair. With just three clicks, it's easier and faster to do the measurements and makes it easier to communicate with the rest of the team. Everybody can see it, everybody can understand, and we are all on the same page.

Dr. Sanchis: When I started using the TSP tool, I thought maybe this is difficult or not so useful. Then you realize its value because you already have your two lines aligned with your plane. It's very easy to perform and it saves you time.

Vivid Pioneer also has a LAA Workflow Suite. How are some of these tools and other features of the system supporting you in left atrial appendage procedures?

Prof. Sitges: The LAA Workflow Suite helps with procedures for LAA occlusion. AI FlexiViews LAA automatically aligns the left atrial appendage with FlexiSlice — so all the planes are already aligned for measurement and guidance.

The LAA Sizing Tool includes magnetic tracing that goes to the boundaries of the LAA to measure the landing zone. It's a really useful tool that gives you the precision and speed to perform

tasks we used to do manually — things that took time to both perform and understand. Now, everything becomes more automatic and is supported by the machine.

Dr. Sanchis: Vivid Pioneer also has new QuickApps, which could be interesting for left atrial appendage procedures. Just push one button and you have direct visualization in 4D of the left atrial appendage in an accorded and anatomical position — with the mitral on the bottom and the pulmonary ridge on the upper part.

From a usability standpoint, how would you describe your experience with Vivid Pioneer?

Prof. Sitges: From the user's perspective, there have been a lot of improvements. We are experienced users, but I can tell you the learning curve is easier because the workflow is much more straightforward and flexible. There are less buttons on the platform, the TGCs are digitized, and you have presets on your left screen.

Also, the design is very nice. The system is compact and smaller, so it's easier to transport, and there have been improvements to the brakes.

Sometimes you need to take the machine out to clean the room, then change the setup and then rebuild everything for a second case. With the transportation mode, you don't need to turn the system off and reboot it every time, so that's really nice. Plus, there are standalone batteries.

And if you work in a place with a lot of people — like anesthesiologists,

interventionalists, and nurses — you're grateful to have a compact machine with the same image quality and faster tools.

From an ergonomic standpoint, I like that the new platform has hand rests. We often have long procedure times, so you really need a place to rest your hands with the probe. Having that space is really, really useful and appreciated by users.

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In a busy cath lab environment, how are these advancements helping enhance communication with the rest of team?

Prof. Sitges: There are very experienced echocardiographers who can understand the image, but it's not just about one person — the whole team needs to see and understand it.

For interventionalists, the image is their eyes — their guide to move the catheters. If the image quality isn't good or available quickly, they're not going to feel confident and the procedure isn't going to work.

Dr. Sanchis: If you have good image quality, you can be more confident when you are guiding interventions and screenings because you can understand the anatomy better. This allows you to communicate better with your peers, the surgeon, or with interventionalists — just to describe the anatomy and decide the best strategy for your patient.

With interventional cardiology advancing so rapidly, how do innovations like Vivid Pioneer shape the future of the field — and what does it mean to be at the forefront of this transformation?

Dr. Sanchis: It's exciting. In the field of valve disease and structural intervention, we're continuously adding more and more technology. It would be impossible to do the kind of interventions we do now with the echo systems of 15 to 20 years ago. The reason we're able to perform more complex interventions now is because we have better imaging.

Prof. Sitges: We are very enthusiastic about imaging — that's why we are so devoted to it. When we see high-quality images like with Vivid Pioneer, we're happy — but we're even more satisfied these images are easy and straightforward to obtain. This is why we work in this rapidly growing field, and Vivid Pioneer is the next step. ■

A new edge for interventionalists

Advanced echo for everyday guidance



As the complexity and scope of structural heart interventions continue to expand, successful outcomes increasingly depend on the seamless collaboration between interventionalists and echocardiographers. Procedures are challenging, anatomy is variable, and the clinical landscape can shift in an instant — making high-quality, real-time imaging guidance essential.

Dr. Xavier Freixa is Director of Interventional Cardiology at the Cardiovascular Institute at Hospital Clínic de Barcelona. He recently experienced Vivid Pioneer firsthand in the cath lab and shared his insights as an interventionalist.

What are your biggest challenges as an interventional cardiologist?

Dr. Freixa: *One of the biggest challenges is the variety of interventions. In the past, we used to do very similar procedures, but now every intervention is completely different. You need to constantly change from one measurement to another, one plane to another, one approach to the next. The procedures are more complex and we need more support from an imaging perspective,*

but we're now capable of doing things that, even five years ago, would have seemed completely impossible.

In the face of complex cases, how would you describe Vivid Pioneer's image quality?

Dr. Freixa: *With Vivid Pioneer, my feeling is — if you can't get good imaging with this system, you're not going to get it. The system provides the tools to have the best experience in terms of echo imaging, anatomical visualization, and Color Flow.*

We're doing interventions that require high image quality, like tricuspid valve repair and tricuspid valve replacement. With Vivid Pioneer, the overall image quality is improved. You get the sense that you're getting more information and details — like pathways, leaks, and jets. I think now you have better accuracy.

How have recent updates to the Color Flow impacted interventions?

Dr. Freixa: *The Color Flow is clearly improved — especially in the 4D environment. It's really high quality, particularly for paravalvular leaks or edge-to-edge repairs when you have a residual leak or residual jet. Now we can identify the point precisely and deliver the solution.*

Another big update involves FlexiSlice. How would you describe the changes?

Dr. Freixa: *I'm very impressed by FlexiSlice — it's one of the most important tools of Vivid Pioneer. FlexiSlice is not new, but the improved image quality and real-time automatic alignment are. It's powerful because it provides a simultaneous display of up to four high-resolution 2D planes — extracted from a 4D volume — on a single screen. It's incredible because, in a single shot on one screen, you have all the information you need to proceed with the intervention. You don't need to wait for a specific plane.*

For example, in edge-to-edge repair, you have everything necessary to move forward with the grasping. Sometimes they even need to stop me so I don't keep going!

The FlexiSlice experience is much better now because you have accuracy, speed, and information all at the same time. You have everything you need to be precise — and for us, that's the most important thing.

How else does Vivid Pioneer simplify and streamline your workflow?

Dr. Freixa: *With the new system, you can get automative measurements and images with little manipulation. It's really important because that makes procedures easier and faster. And if everything goes faster, you're able to do more procedures in one morning or in one day. It makes our life easier.*

Vivid Pioneer has another feature called 4D Markers — can you describe the benefits?

Dr. Freixa: *4D Markers helps with communication between the echocardiographer and the interventional cardiologist. It's an important feature to direct interventions and localize different points. I believe it's probably intended for people with less experience —*

teams that are building their experience. Having these different markers and the ability to speak the same language is very important.

Vivid Pioneer is equipped with a power interruption feature that maintains scanning capabilities for up to five minutes during accidental power outages or disconnections. What is the potential impact on your interventions?

Dr. Freixa: *In the past, we had an interruption during a case, and we were lucky because nothing serious happened. But if you were in a delicate stage of an intervention, it could definitely be a problem. I see this as a safety issue, and I believe this feature and the standalone battery are necessary.*

Vivid Pioneer is the latest technology to complement Allia™ IGS 7 — GE HealthCare's interventional image-guided platform. What is the value of having these systems operating together in the cath lab?

Dr. Freixa: *We have worked with GE HealthCare echo systems for a decade and added the X-ray solution in the last few years. Having the latest technology with the Allia platform and now Vivid Pioneer makes everything easier — integration, image quality. We are also experienced with the technology, so when it comes to workflow, preparation, and setup — it really simplifies everything.*

In closing, how would you summarize your experience with Vivid Pioneer?

Dr. Freixa: *The main potential of Vivid Pioneer is its image quality, especially the powerful Color Flow. Second is the consistent image quality with a stable probe that does not overheat, which is crucial during long interventions. And finally, I love FlexiSlice. I think it's very powerful to have so much information on a single screen. The quality is really a step forward.*

For me, having Vivid Pioneer is like having a Ferrari — it is the best technology available currently. If you're not getting better image quality, it's because it's not possible.





Marta Sitges, MD, PhD is a senior consultant non-invasive cardiologist at the Cardiovascular Institute at Hospital Clínic de Barcelona and Professor of Medicine at the University of Barcelona. Her main clinical practice is related to clinical and interventional echocardiography, sports cardiology, and heart valve disease. She has published more than 450 peer reviewed papers and presented more than 300 lectures in national and international meetings. Professor Sitges has been the Director of the Cardiovascular Institute since 2015.



Laura Sanchis, MD, PhD specializes in noninvasive cardiac imaging at the Cardiovascular Institute at Hospital Clínic de Barcelona. She is part of the Valve Team and performs echocardiography and advanced echocardiography techniques, as well as echo-guidance of structural interventions in the catheterization lab. Her main research currently focuses on the application of cardiac imaging to understand the pathophysiology of heart valve disease, its clinical management, and the structural heart interventions planification. Dr. Sanchis is credited with more than 100 research publications.



Xavier Freixa, MD, PhD is Director of the Interventional Cardiology Department at the Cardiovascular Institute of Hospital Clínic de Barcelona. Dr. Freixa is recognized for his clinical excellence and contributions to advancing minimally invasive cardiovascular procedures. He specializes in complex coronary interventions and leading-edge structural heart procedures, including transcatheter valve therapies and congenital defect closures. Dr. Freixa's research includes more than 100 scientific publications, multiple clinical trials, and principal investigator roles in many international studies.

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