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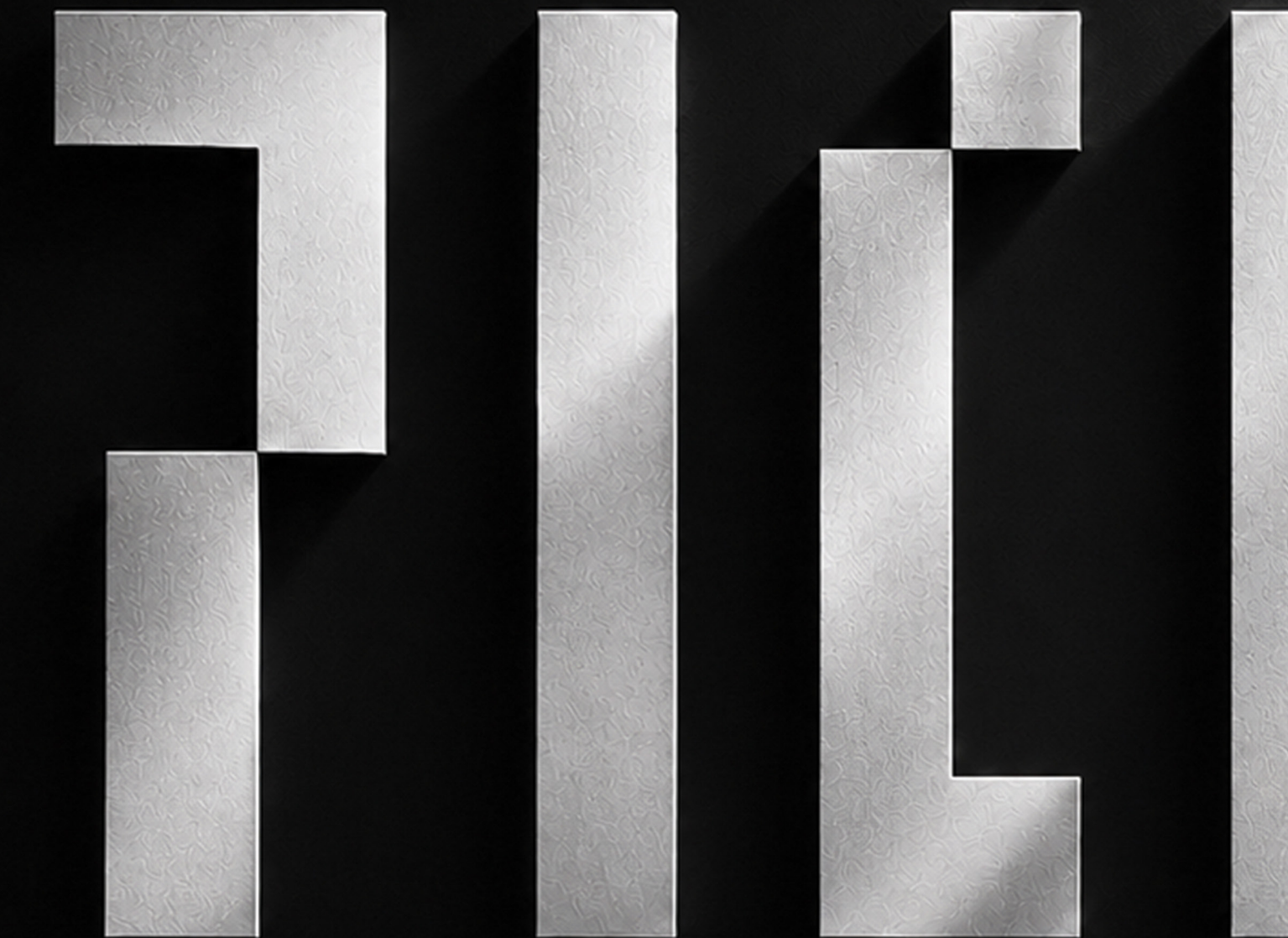
CANCERWORLD



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NOT FOR SALE

10 Years of PICI: From Discovery to Impact

Ten years ago, the Parker Institute for Cancer Immunotherapy (PICI) was created around a bold premise: that progress in cancer research could be accelerated by changing not only what science pursued, but how science was organised.

The timing was significant. Immunotherapy was redefining what was possible in oncology, offering durable responses in cancers that had long resisted treatment. But scientific possibility alone was never enough. Discoveries still had to cross the difficult distance between laboratory insight and clinical reality.

Breakthroughs do not reach patients on their own.

They require exceptional fundamental science, collaboration across institutions and disciplines, infrastructure capable of supporting translation, investment willing to accept uncertainty, and systems designed to learn from both success and failure.

This CancerWorld special issue, dedicated to PICI's 10th anniversary, explores what can happen when those elements are deliberately brought together. Across these pages, scientists, leaders, entrepreneurs, and patients reflect on a decade shaped by discovery, collaboration, and the determination to turn scientific possibility into patient impact.

The meaning of that work becomes clearest in the experiences of patients. Mary Elizabeth Williams lived through the moment when experimental immunotherapy became a second chance at life. Ariana Nakata's journey shows both the extraordinary possibilities of emerging science and the barriers that can still separate innovation from the people who need it.

Their stories remind us that progress is not measured only by discoveries, publications, companies, or new therapies. It is measured by whether science changes what is possible for patients and whether those possibilities can actually be reached.

As PICI enters its second decade, new generations of cell therapies, therapeutic cancer vaccines, immune engineering, systems immunology, and computational science are expanding the boundaries of what may be possible. But the larger challenge remains: protecting bold discovery while building the ecosystem capable of carrying its most promising advances, responsibly and efficiently, toward patients.

It is not only a story about advancing cancer immunotherapy. It is a story about what becomes possible when the way science is done becomes part of the innovation itself.

Knarik Arakelyan, Managing Editor, CancerWorld

Dear Colleagues,

Every year, more than 20 million people around the world hear the words no one wants to hear: you have cancer. They sit across from their doctors, their families at their sides, and ask the question the researchers have committed their lives to answering: "Is there a cure?"

That very question is why the Parker Institute for Cancer Immunotherapy (PICI) was created in 2016.

The network designed in those early days brought together the world's leading researchers in cancer immunotherapy to collaborate across institutional silos in order to drive science that would address the most pressing challenges in the field. From these efforts, breakthrough research has led to major advances in patient treatment for a multitude of cancers.

Now entering our 10th year, we have intensified our mission to develop and expand access to breakthrough cancer therapies. Our three-part model makes that mission possible: exceptional discovery science that changes paradigms, technology that accelerates collaboration, and ventures that move discoveries into trials. This strategy is as unique as it is powerful, and 10 years of progress have demonstrated our ability to collapse the timeline between a lab result and a patient who benefits from a PICI-generated discovery.

In this new era, we are committed to growing our impact even further, and to increasing the pace at which we deliver cancer cures. In this special issue, we welcome you to learn more of PICI's incredible journey of the past ten years and the path forward we are forging to deliver on our vision of making cancer a curable disease.

As we enter our next decade, we carry forward the same conviction that shaped PICI from the beginning: that extraordinary science, brought together with purpose, can change what is possible for people with cancer.

Karen E. Knudsen, MBA, PhD
Chief Executive Officer and Board Member,
Parker Institute for Cancer Immunotherapy

DR KAREN E. KNUDSEN

2016

PICI IS ESTABLISHED

The Parker Institute for Cancer Immunotherapy (PICI) was established in April 2016 in San Francisco, California, through a $250 million founding grant from Silicon Valley entrepreneur and philanthropist Sean Parker. Jeffrey Bluestone became the first President and CEO of PICI.

2016 — PICI LAUNCHES WITH SIX FOUNDING INSTITUTES

The founding six partner centers are:
Memorial Sloan Kettering Cancer Center
The Leland Stanford Jr. University
University of California, Los Angeles (UCLA)
University of California, San Francisco (UCSF)
University of Pennsylvania
The University of Texas MD Anderson Cancer Center

2017 — FIRST MAJOR DISCOVERY FROM THE PICI NETWORK

Just one year after PICI was founded, researchers from the University of Pennsylvania and Memorial Sloan Kettering Cancer Center collaborated on a major study identifying a blood-based predictor of response in patients with melanoma.

Published in *Nature,* the study provided an early demonstration of PICI's collaborative model in action, bringing researchers across institutions together around shared scientific questions.

2018 — JAMES ALLISON SHARES THE NOBEL PRIZE IN PHYSIOLOGY OR MEDICINE

James P. Allison, Director of the PICI Center at The University of Texas MD Anderson Cancer Center, shared the 2018 Nobel Prize in Physiology or Medicine with Japanese immunologist Tasuku Honjo for their discoveries leading to cancer therapy through inhibition of negative immune regulation.

2019 — ARSENALBIO BECOMES PICI'S FIRST BUILT COMPANY

ArsenalBio, the first company formed through the core collaboration of PICI network investigators, and PICI funded research and intellectual property, launched in October 2019 with an $85 million Series A financing round.

The milestone marked an important expansion of PICI's model—from enabling collaborative scientific discovery to creating pathways for translating innovation into new therapeutic approaches.

2022 — DANA-FARBER CANCER INSTITUTE AND GLADSTONE INSTITUTES JOIN PICI

Dana-Farber Cancer Institute and Gladstone Institutes joined PICI in 2022, expanding the network and bringing additional scientific expertise into its collaborative research ecosystem.

2023 — WEILL CORNELL MEDICAL COLLEGE JOINS PICI

Weill Cornell Medical College joined PICI in 2023, further expanding the institute's network of leading cancer research centers.

2023 — FIRST MAJOR ACQUISITION OF A PICI FUNDED SPINOUT

In February 2023, Gilead Sciences, through Kite Pharma, completed its acquisition of Tmunity Therapeutics.

Tmunity was founded by a team of University of Pennsylvania scientists, including CAR-T pioneer Dr. Carl June, whose research had been supported within the PICI ecosystem. The acquisition represented an important milestone in the translation of PICI-supported science into biotechnology development.

2025 — DR. KAREN KNUDSEN JOINS PICI AS CEO

Dr. Karen Knudsen became Chief Executive Officer of PICI in April 2025, beginning a new leadership chapter for the institute as it approached its tenth anniversary.

2025 — FRED RAMSDELL SHARES THE NOBEL PRIZE IN PHYSIOLOGY OR MEDICINE

Dr. Fred Ramsdell, former CSO of PICI, won the Nobel Prize in Physiology or Medicine in October 2025. He shared the honor with Mary E. Brunkow and Shimon Sakaguchi for their fundamental discoveries concerning peripheral immune tolerance.

2026 — CANCER VACCINE COALITION JOINS PICI

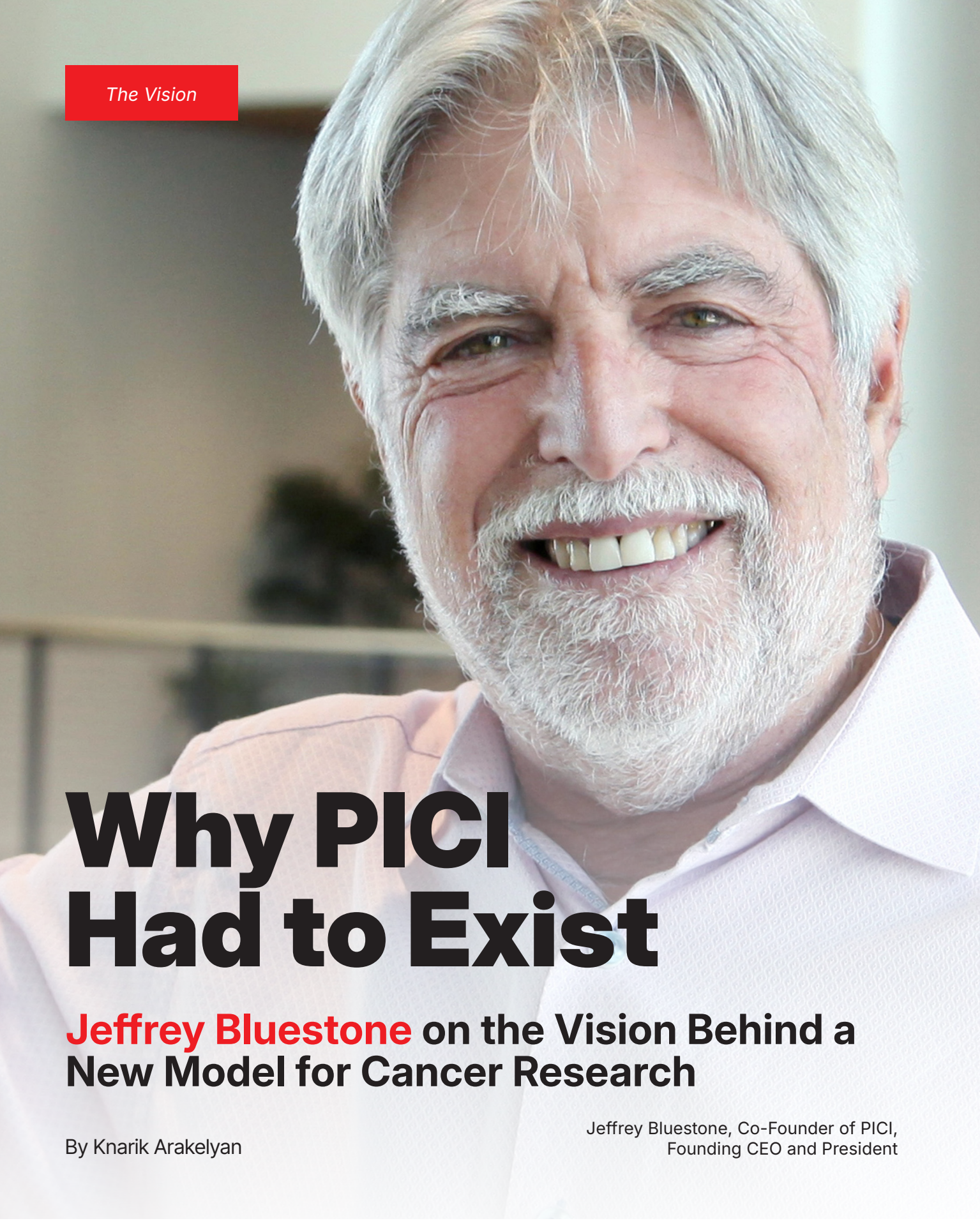
On April 14, 2026, the Cancer Vaccine Coalition (CVC) officially joined the Parker Institute for Cancer Immunotherapy.

The strategic integration brought CVC's operations, advocacy and fundraising efforts into the PICI ecosystem, strengthening the connection between cancer vaccine development and PICI's broader immunotherapy research and translational infrastructure.

IMPORTANT METRICS

7	> 1,000	126	17	$4B
Member Institutions	Investigators	Inventions Licensed or Optioned	Biotech Ventures	Raised

The Vision



Why PICI Had to Exist

Jeffrey Bluestone on the Vision Behind a New Model for Cancer Research

By Knarik Arakelyan

Jeffrey Bluestone, Co-Founder of PICI,
Founding CEO and President

Ten years ago, the Parker Institute for Cancer Immunotherapy (PICI) was built around a deceptively simple idea: some of the greatest barriers to progress in cancer research were not scientific. They were structural.

Extraordinary scientists were working across extraordinary institutions, but the academic system was still largely organised around individual laboratories, institutional boundaries, competition for resources and recognition, and discoveries that could struggle to make the difficult journey from the laboratory to patients.

Sean Parker believed there had to be another way.

Jeffrey Bluestone, PhD, Co-Founder of the PICI understood why.

Bluestone had spent decades at the forefront of immunology, including early work on CTLA-4 and T-cell activation. As founding director of the Immune Tolerance Network and later Executive Vice Chancellor and Provost at the University of California, San Francisco, he had also seen what became possible when scientists were given the infrastructure and the incentives to work together.

When Parker approached him about building what would become the Parker Institute for Cancer Immunotherapy, Bluestone saw an opportunity not simply to fund more cancer research, but to change the conditions under which that research happened.

The ambition was audacious: bring some of the country's leading cancer immunologists and institutions into a common scientific ecosystem; create an environment in which unpublished ideas could be shared openly; invest in young investigators; build joint clinical and bioinformatics capabilities; and create pathways capable of carrying discoveries beyond academia and toward new medicines.

In Bluestone's language, they wanted to create a ***"sandbox."***

A decade later, that metaphor still captures something fundamental about PICI.

The boundaries mattered. But so did what happened inside them.

Building the Sandbox

Bluestone is careful about where the original impetus came from.

"To be fair, it was really Sean Parker who felt that the traditional model of cancer immunotherapy was not delivering, especially on the cell therapy side," he says.

Together with others, including Adam Kolom and Michael Polansky, Parker and Bluestone began developing an alternative.

The idea was not to build another centre at a single university. It was to connect leading institutions across the United States around a shared mission.

"We wanted to create a compelling vision of collaboration among the top people and institutions in the country—to create a sandbox for folks to play."

The word play should not be mistaken for a lack of seriousness. Bluestone's sandbox had deliberate boundaries and serious infrastructure: scientific retreats, support for young investigators, resources for collaborative clinical trials, and bioinformatics capabilities that could help researchers understand the consequences of translational research in unprecedented depth.

The institutions themselves were selected for more than scientific prestige.

They needed an exceptional combination of basic and translational researchers. But they also had to be willing to collaborate—not only on research, but on clinical trials, intellectual property, and a shared mission.

PICI was therefore designed from the beginning as more than a funding mechanism.

Its architecture was intended to change behaviour.

Collaboration by Design

For Bluestone, the idea was also deeply connected to his own career.

As founding director of the Immune Tolerance Network, he had experienced the value of connecting investigators around common scientific problems. At University of California, San Francisco (UCSF), he had seen both the power of major academic institutions and the complexity of working across them.

Meanwhile, cancer immunotherapy itself was moving into a new era.

Bluestone had been involved in early work demonstrating the importance of CTLA-4 in T-cell activation, while his laboratory was developing cell therapies for autoimmune disease. He knew many of the scientists who were defining the emerging field.

"I knew almost all the players in the field," he says. *"I respected them enormously, and I felt that I could help guide this effort, with Sean's support."*

Kolom and Polansky, he emphasises, were also critical to transforming the concept into an institution—developing the mission, creating the master agreement with participating sites and helping execute the vision.

What PICI assembled was not entirely unprecedented in its individual components.

The novelty was in putting them together.

"In a way, the various aspects previously existed, but never packaged in this way to accelerate advancements," Bluestone says.

Substantial institutional and investigator support. High-level scientific gatherings. Investment in young researchers. A concentrated focus on cancer immunotherapy. Shared translational infrastructure.

Together, they created something different.

But the model was also designed to change more than how scientists collaborated. It was created to change the scale of "imagination".

One of PICI's founding ambitions was to *"empower scientists to think big again."* The funding model deliberately combined stable support for participating sites with the possibility of substantially larger project grants for teams pursuing ambitious ideas. Stability gave investigators greater freedom to concentrate on science; additional resources created an incentive to pursue questions that might otherwise have been considered too bold, too collaborative or too expensive.

The question PICI wanted scientists to ask was fundamentally different: ***"What would you do—really do—if money was no object?"***

It was a challenge to move beyond the constraints of the conventional $250,000 federal R01 grant and the incremental thinking those limits could sometimes encourage. The goal was not simply to provide more money, but to create the conditions for greater scientific ambition: stability for individual investigators, combined with the resources and incentive to think much bigger as a team.

Founding Center Directors and Board Members of the PICI network: from left to right - Jim Allison, PhD (Center Director, MD Anderson), Antoni Ribas MD (Center Director, UCLA), Jedd Wolchok MD PhD (originally Center Director, Memorial Sloan Kettering Cancer Center, now Center Director, Weill Cornell Medicine), Peggy Hamburg MD (PICI Board Member), Sean Parker (PICI Founder and Board Chair), Jeff Bluestone PhD (PICI CEO and President, Board Co-chair), Crystal Mackall MD (Center Director, Stanford Univ), Lewis Lanier PhD (Center Director, UCSF), Carl June MD (Center Director, Univ Pennsylvania)

When Competitors Became Collaborators

There was another problem PICI had to overcome.

Many of the scientists it hoped to bring together had spent years or entire careers competing.

Academic science rewards individual achievement: grants, publications, promotions, prizes. Collaboration may be celebrated rhetorically, but the incentive structures surrounding scientists have historically been far more complicated.

PICI was asking some of the most accomplished researchers in the field to behave differently.

Bluestone believes personal trust helped.

"These leaders of the individual centers were largely people I knew and respected," he says.

They also understood that PICI would provide substantial financial and administrative support without attempting to over-engineer their science.

And then there was another force at work.

"There was clearly FOMO," Bluestone says, with characteristic directness, as Nobel laureates, National Academy members and other leaders in the field began joining the effort.

But attracting exceptional people was only the beginning. The real test was whether researchers accustomed to competition would actually share.

The answer became visible at PICI's retreats.

"The Trust in the Room was Palpable"

Asked which decision in PICI's early history required the greatest leap of faith, Bluestone does not point to funding, institutional negotiations or organisational structure.

He points to the retreats.

"Not only did everyone show and stay the whole time, but person after person presented their best science—never published, always groundbreaking."

In academic science, unpublished findings are currency. Sharing them before publication requires something difficult to manufacture institutionally: trust.

Yet that is precisely what began happening.

"The trust in the room was palpable," Bluestone recalls.

"Maybe the 'I want to show my best' attitude was contagious."

The retreats became a physical expression of what PICI was attempting to build.

Scientists did not simply arrive for their presentation and leave. They stayed. They listened. They exposed work that was still evolving. Ideas moved across institutional lines.

Collaboration was no longer an aspiration written into a mission statement.

It became a behaviour.

The Non-Negotiables

Trust, however, could not depend entirely on goodwill. Some of the most consequential elements of the PICI model were embedded into its structure from the beginning.

"We asked for real buy-in from the institutions," Bluestone says.

That meant participating institutions had to be willing to share intellectual property with other PICI sites. They had to allow PICI to facilitate business development, including licensing and company creation. And they had to give PICI centres meaningful visibility and participation within their own institutions.

These were not minor administrative conditions.

They challenged some of the traditional boundaries separating major academic centres.

And they were non-negotiable.

PICI was effectively asking institutions to accept that a discovery might become more valuable scientifically and ultimately for patients if the walls around it became more permeable.

That required courage from both institutions and individuals.

Without it, Bluestone believes the experiment could easily have failed.

"I imagine a lack of courage and trust by institutions and individuals" would have been among the greatest threats, he says.

Then comes one of the most memorable descriptions of the challenge:

"I always say it is easier to herd the cats if you provide some food."

But money alone, he insists, was never the point.

"In the case of PICI, it has never been first and foremost about the dollars. It has been about the overall value proposition laid out by Sean to tackle cancer full-on using the immune system as the weapon."

Members at the PICI retreat in Hawaii: from left to right - Jeff Bluestone PhD, Jill O'Donnell-Tormey PhD (former CEO, Cancer Research Institute, Phil Greenberg MD (Extramural Member Investigator, Fred Hutchison Cancer Center), Lucy Rudensky and Alexander Rudensky PhD (Extramural Member Investigator, Memorial Sloan Kettering Cancer Center)

Why PICI was Built Outside Academia

One early decision may have quietly enabled much of what followed.

When Parker and Bluestone first discussed the institute, they considered establishing it within UCSF.

On paper, the idea made sense. UCSF was already one of the world's leading biomedical institutions, and Bluestone occupied a senior leadership position there.

But the more they considered what PICI needed to become, the clearer the problem became.

An organisation intended to connect multiple universities could not easily be perceived as belonging to one of them.

"It became apparent that the best way to build the institute in relationship to participation and trust would be to house it outside an academic structure as a free-standing organization," Bluestone says.

"I believe this was key to PICI's success."

Independence gave the institute something difficult to achieve from within a single university: neutrality.

PICI could become connective tissue rather than another institutional centre competing for primacy.

Beyond the Academic Walls

There was another lesson embedded in PICI's founding philosophy: supporting academic science would not, by itself, be enough.

"We knew from the start that the investment in the academic sites was only the start," Bluestone says.

If discoveries were going to become medicines, PICI needed a broader ecosystem.

That meant partnerships with nonprofit organisations such as the Cancer Research Institute, relationships with pharmaceutical companies such as Bristol Myers Squibb (BMS), and eventually the creation of companies emerging from work within the PICI community, including Tmunity and Arsenal.

The objective was not to replace academia or industry.

It was to build a bridge between them.

More precisely, PICI was conceived as a new middle ground between two worlds with very different strengths. Academia offered extraordinary creativity and intellectual freedom; biotechnology companies brought the resources, infrastructure and ability to execute at scale. PICI's ambition was to combine elements of both.

The idea was to bring what Bluestone describes as the *"power of a mid-size biotech company"* into the centre of the institute—giving scientists in traditionally academic positions access to the resources (clinical trial expertise, bioinformatics, biomarker discovery, regulatory affairs) needed to pursue big, bold science without stripping away the freedom that made those ideas possible in the first place.

And when those ideas were ready to move beyond academia, the model could help create new companies capable of carrying them toward therapies and, ultimately, patients.

Bluestone describes PICI's future in precisely those terms: a place *"where academia meets industry,"*

capable of bridging the translational medicine gap and helping create new medicines for some of the most difficult cancers.
That bridge may prove as important to PICI's legacy as any individual discovery.

First PICI retreat : from left to right - Co-Founders - Jeff Bluestone PhD, Sean Parker, Michael Polansky (Parker Foundation)

What PICI Proved

A decade into the experiment, Bluestone believes PICI demonstrated that behaviours often considered incompatible with elite academic science could coexist. Exceptional scientists could collaborate deeply.

Institutions could share.

Companies could emerge from discoveries spanning multiple academic centres.

Young investigators could be drawn toward collaborative environments when given meaningful support.

And leading scientists could devote substantial time not merely to their individual laboratories, but to building a collective scientific enterprise.

None of that, Bluestone stresses, was guaranteed.

Scientists are traditionally rewarded for individual contributions. PICI attempted to demonstrate that collaboration itself could become productive, valuable and worth rewarding.

The model also faced skepticism from the beginning. Why these institutions? Why these investigators? Why wasn't the funding open to everyone? Why focus so tightly on cancer immunotherapy and particularly cell therapy rather than cancer or immunology more broadly?

Behind those questions was an even larger one: could this relatively new organisation truly influence the trajectory of an entire field?

Ten years later, cancer immunotherapy occupies a radically different place in oncology.

PICI did not create that transformation alone, nor does Bluestone suggest it did. But the institute was built around the conviction that concentrating exceptional people, resources and translational infrastructure around a clearly defined problem could accelerate what became possible.

The Discovery Engine

For Bluestone, scientific progress is rarely a straight line.

It requires persistence, passion and, as he puts it, *"a bit of serendipity."*

It is a philosophy he carried from the Immune Tolerance Network into PICI.

"There was no such thing as a failed clinical trial as long as you learned something that helped understand the basis of disease and led to more insights in the next iteration," he says.

PICI operates according to the same logic.

There will be breakthroughs. Bluestone points, for example, to developments in cell therapy for glioblastoma. But the institution cannot be built around waiting for individual moments of triumph.

The deeper responsibility is to protect the machinery that makes those moments possible.

"The core discovery engine must be supported."

That may be one of the most important lessons of PICI's first decade.

Breakthroughs attract attention.

Discovery engines create them.

Three Principles for the Next Decade

Science will change dramatically over PICI's second decade. Technologies will evolve. New therapeutic modalities will emerge. The boundaries between biology, engineering, computation and medicine will continue to blur.

Bluestone nevertheless believes the institute's fundamental principles should remain remarkably simple. He distils them into three lines:

"Support and nurture kickass science."

"Collaborate like hell."

"Make a difference."

The language is characteristically Bluestone: informal, uncompromising and easy to understand.

The first protects scientific ambition.

The second rejects isolation.

The third insists that discovery ultimately has to matter beyond the laboratory.

Together, they capture much of what PICI was designed to accomplish.

Informal setting retreat: from left to right - John Wherry PhD (current Center Director, Univ. Pennsylvania), Jeff Bluestone PhD, Bob Vonderheide MD DPhil (former co Center Director, Univ. Pennsylvania) and Phil Greenberg MD.

A Biological Revolution

Bluestone says he is *"not a legacy kind of guy."*

But ask him to look far enough into the future, and the scale of his ambition becomes unmistakable.

He expects discoveries by PICI investigators to contribute to new therapies, particularly in cell therapy; to generate new drugs directly or through industry partnerships; and to create companies capable of carrying discoveries toward patients.

"When you support and nurture great science, good things happen," he says. "And I expect PICI will be a part of the transformation of cancer care."

His horizon extends well beyond PICI's tenth anniversary.

"In 20 years, we will look back and recognize that the biological revolution has taken place, not unlike the Industrial Revolution, in transforming cancer treatment."

And he expects PICI and its investigators to have played a role in that revolution.

Perhaps that is ultimately the most meaningful way to understand why PICI had to exist.

It was not founded on the assumption that one laboratory, one institution or even one breakthrough would solve cancer. It was built on the proposition that the structure surrounding great science matters—that trust and collaboration can be deliberately built into that structure, and that discovery must ultimately find a path to patients.

Ten years later, Bluestone's prescription remains strikingly simple: support extraordinary science, collaborate without reservation, and make sure the work matters.

If PICI can preserve that philosophy as the science around it changes, its most enduring contribution may ultimately be larger than any single therapy: proving that transforming how science is done can transform what science delivers for patients.

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Reinventing Cancer Research

Fred Ramsdell on the Vision Behind PICI and Why Cancer Science Needed a New Model

By Knarik Arakelyan

Dr. Fred Ramsdell, the Nobel laureate and former Chief Scientific Officer of the Parker Institute for Cancer Immunotherapy (PICI) has spent much of his scientific career watching ideas once considered improbable become medicine.

His work on regulatory T cells and the mechanisms that prevent the immune system from attacking the body helped transform our understanding of immune tolerance—research for which he shared the 2025 Nobel Prize in Physiology or Medicine. The implications of those discoveries now reach across autoimmune disease, cancer, transplantation, and other areas of human biology.

But Ramsdell's career has also moved repeatedly between worlds that science has traditionally kept apart: fundamental biology and drug development, academia and biotechnology, discovery and translation. Later, as Chief Scientific Officer of PICI, those experiences converged around a question at the heart of modern cancer research:

What does it take to turn extraordinary biology into something that actually changes a patient's life?

For Ramsdell, the answer has increasingly become clear.

No one can do it alone.

That conviction made PICI's founding proposition particularly compelling. Jeffrey Bluestone and Sean Parker were not simply proposing another cancer research organisation. They were attempting to create an environment in which exceptional scientists, institutions, technologies, and companies could work across the boundaries that traditionally separated them.

The timing mattered. Immuno-oncology was demonstrating that the immune system could accomplish what generations of researchers had struggled to imagine. At the same time, those breakthroughs were revealing just how complex cancer really was and how difficult it would be for individual laboratories or institutions to solve that complexity alone.

"I don't think the system was broken," Ramsdell says. *"But I think it didn't meet the current demands of the time."*

PICI offered an opportunity to build something different.

And Ramsdell was not intimidated by the scale of the proposition.

"Why is ambition a problem?" he asks. *"Particularly if you're trying to cure cancer?"*

It is a revealing question from a scientist who has repeatedly watched conventional wisdom overturned.

Ramsdell remembers when antibodies were regarded with scepticism as medicines: too large, too complicated, too difficult to develop. Later, similar doubts surrounded immuno-oncology. The immune system was considered too complex to manipulate reliably against cancer.

Science proved otherwise.

So when Parker proposed bringing leading cancer immunologists together across institutional boundaries to attack the disease differently, Ramsdell did not see an ambition that needed to be moderated.

He saw a problem that demanded one.

"It resonated right away."

For Ramsdell, PICI would become an experiment not simply in developing cancer immunotherapies, but in asking whether changing the way scientists worked together could change what science itself made possible.

Beyond the Magic Bullet

Ramsdell came of age scientifically in a very different era of cancer medicine.

As a graduate student at UCLA in the 1980s, he remembers a world in which curing cancer largely meant being fortunate enough to have a tumour that could be removed surgically. Otherwise, treatment often meant trying to control disease while making patients "incredibly sick" in the process.

"That was not very satisfying."

Immuno-oncology began to rewrite that reality.

Checkpoint inhibition demonstrated that the immune system could be released from molecular restraints and redirected against cancer. Cell therapies showed that immune cells themselves could become

extraordinarily powerful medicines.

But success revealed another truth: cancer was unlikely to yield to simplicity.

"This idea of a common, single magic bullet was probably not going to be true."

Cancer is not one disease. Tumours are not static targets. They evolve. Immune systems differ. Tumour microenvironments suppress responses. Resistance develops. A therapy that produces a remarkable response in one patient may accomplish little in another.

The question therefore became more complicated than whether the immune system could fight cancer.

Scientists needed to understand ***why it worked, when it worked, why it stopped working, and how multiple biological mechanisms could be manipulated together to produce deeper and more durable responses.***

That required more than a new generation of therapies.

It required a different way of doing science.

Designing Collaboration Instead of Hoping for It

Collaboration is one of the most frequently invoked ideals in biomedical research.

Creating it is considerably harder.

Scientists compete for funding, publications, talent, intellectual property, recognition, and institutional resources. Academic structures have historically rewarded individual achievement far more reliably than collective success.

PICI attempted to change the conditions around them.

The goal was not merely to assemble prominent investigators under a common banner. It was to build an environment in which collaboration became scientifically useful enough that researchers would choose it.

For Ramsdell, that distinction is crucial.

"People like to collaborate, but not in the way that we wanted them to," he says. *"We set up the infrastructure to let them do it."*

That infrastructure mattered. PICI collected samples, helped run trials, handled administrative work and tried, in Ramsdell's words, to *"make it easy to collaborate."* PICI's meetings and retreats became important parts of that culture. Investigators could discuss unpublished findings, challenge assumptions, discover complementary expertise, and begin projects that crossed laboratories and institutions.

Ramsdell remembers organising parallel retreat sessions around areas such as vaccines and cell therapy—and discovering that researchers increasingly complained that they wanted to attend several sessions at once.

"There was this inherent interconnectedness," he recalls.

"Everybody wanted to be involved in everything at the same time."

The result was something more important than networking. It created intellectual proximity.

A problem encountered in one laboratory might find its solution in another. A biological insight could meet a technology capable of testing it. A clinician could bring a question emerging from patients to scientists able to interrogate the underlying mechanism.

The network became more than the sum of its members.

And in a field as complex as cancer immunology, that mattered.

When the Whole Becomes Greater Than the Parts

Ramsdell's career across academia and biotechnology had already taught him that scientific discovery and therapeutic development require very different capabilities.

A laboratory may uncover extraordinary biology

without possessing the infrastructure to turn it into a drug. A biotechnology company may have development expertise but depend on fundamental discoveries originating elsewhere. Clinicians encounter patterns in patients that laboratory scientists may never see. Computational scientists can identify signals hidden within datasets too large for conventional analysis.

The breakthrough may exist somewhere between them.

PICI's model was designed to make those intersections easier.

A fundamental immunologist might identify a mechanism. Another investigator might possess the technology needed to manipulate it. A clinician might understand where the approach could matter most. Computational expertise might reveal which patients are likely to respond. Translational and industry experience might determine how the concept could ultimately become a therapy.

Individually, each contribution can be exceptional.

Together, they can become something none could produce alone.

Ramsdell remembers one moment that crystallised how unusual that environment could be. He proposed a vaccine trial involving five drugs from five different companies—three of them not yet approved. His colleague listened and responded, essentially: Okay. Let's see if we can do it.

The eventual trial was not identical to the original proposal. But for Ramsdell, the response itself mattered.

"The attitude that said, 'Yeah, let's try to do that,' was one of the moments where I thought, okay, this place is different," he recalls. "There's no company that would have even thought about that for half a second."

That philosophy also changed how clinical research could be understood.

A clinical trial is conventionally judged by whether a treatment succeeds or fails. For Ramsdell, that binary view misses an enormous scientific opportunity.

If a therapy does not work, the critical question becomes: **why?**

Why did one patient respond while another did not? Why did a tumour initially regress and later return? What changed inside the tumour microenvironment? Which pathways emerged as resistance developed?

"In those clinical trials, always try to understand what that drug did in those patients," Ramsdell says. *"So that if it didn't clinically work… you learned enough that it will help you in the next iteration."*

When trials are designed to capture those answers, the patient does not sit at the end of the scientific process.

The patient becomes part of the discovery process.
Information moves from laboratory to clinic and then back again.

That cycle can produce the next hypothesis, the next combination, the next trial.

In this model, even disappointment can generate knowledge.

Protecting Science Before its Value is Obvious

There is an apparent tension at the centre of modern biomedical research.

Patients urgently need better treatments. Funders want impact. Investors want evidence. Institutions increasingly emphasise translation.

Yet many of medicine's most transformative advances began with research whose practical value was impossible to predict.

Few people understand that contradiction better than Ramsdell.

His Nobel Prize-winning work grew out of fundamental questions about immune tolerance: how does the immune system distinguish what should be attacked from what must be protected? How does the body prevent immune cells from turning their destructive power against healthy tissue?

Those were biological questions before they were therapeutic ones.

The discoveries concerning peripheral immune tolerance ultimately established fundamental principles of immune regulation and opened new avenues for therapeutic research in cancer, autoimmune disease and transplantation.

But those consequences were not written into the original experiments.

Twenty-five years later, Ramsdell can see clinical trials using knowledge that began with those fundamental questions. He can also see implications that he and his colleagues could not have anticipated when the discoveries were made.

"The point I would make is that studying how the immune system fundamentally works has very clear implications for medicine and physiology and biology," he says. As knowledge grows, *"the opportunities to take advantage of it will continue to grow, and it will have implications that we didn't think about back in the year 2000 when we figured this out."*

That experience has left Ramsdell deeply conscious of the danger of demanding that every scientific question justify itself through an immediately identifiable product.

If researchers are permitted to pursue only discoveries whose destination can already be predicted, science risks eliminating precisely the uncertainty from which transformative breakthroughs emerge.

Fundamental research and translation are therefore not competitors.

They are parts of the same continuum.

You need the freedom to discover something before you know why it will matter. And when it does matter, you need a system capable of moving it forward.

That balance sits close to the heart of the PICI model: protect exceptional science, but do not allow exceptional science to become stranded when the possibility of helping patients appears.

Working process in a laboratory

Failure is Information

That philosophy also changes the meaning of scientific failure.

Cancer research is filled with experiments that do not behave as expected and therapies that fail to reproduce promising laboratory results in patients. In a system built primarily around positive outcomes, those moments can be viewed as endpoints.

Ramsdell sees them differently.

"You do have to take some shots," he says. *"You do have to put it into patients and try and see if you're right. And sometimes you aren't."*

The obligation, then, is to learn enough from those moments that the next attempt becomes smarter.

A well-designed experiment that disproves a hypothesis has still produced knowledge. A clinical trial that fails to achieve the hoped-for outcome can still reveal something fundamental about human biology—provided researchers have built the scientific infrastructure to learn from it.

Progress does not come from avoiding failure altogether. It comes from making failure informative.

The Measure that Matters

For all the complexity of immunology, engineering, clinical trials, and institutional design, Ramsdell repeatedly returns to a much simpler measure of success.

Patients.

Scientific careers are measured through papers, grants, citations, patents, companies, prizes, and positions. All have value.

Cancer imposes another standard.

Did the work change what happened to someone with the disease?

For Ramsdell, the answer is unambiguous.

"For oncology, for me, success is clearly extending somebody's life," he says. *"And I don't mind using the word cure."*

But he is equally clear that progress does not have to arrive all at once.

"If we can make people's lives better for three years instead of three months, okay, I'll take that. It's not where I want to be, but I will take those little victories."
That distinction matters.

The ultimate ambition remains cure. But between the impossible and the cure are months gained, years gained, suffering reduced, responses deepened—and lives changed.

What a Decade has Proved

Ten years after PICI's founding, the significance of the experiment extends beyond any single programme or therapy.

The larger question was whether a different scientific culture could actually be built.

Can world-class investigators accustomed to competing also collaborate deeply? Can institutions share enough to make discoveries move faster? Can fundamental science coexist with an intense commitment to translation? Can academia and biotechnology meet earlier in the process without compromising the intellectual freedom on which discovery depends?

And can all of this be organised around problems too complex for any one institution to solve?

Ten years of experience suggest that the answer can be yes.

"We could coordinate and integrate different groups together in a way that people wouldn't do without us," Ramsdell says. *"I think that's one of the things that, in the ten-year time frame, people will look at and think: no one else really does that. And I'm pretty proud of that."*

Money matters, but money alone cannot create trust. Infrastructure matters, but infrastructure cannot create scientific imagination. Networks matter, but simply connecting people does not guarantee that they will take intellectual risks together.

The model works only if the science remains strong enough to justify the collaboration.

Collaboration is not the objective. Better science is. Collaboration is powerful because it allows better science to happen.

The Work Still Ahead

A decade of progress does not mean the model has finished evolving.

If Ramsdell could change one thing, it would be the scale and diversity of funding available for the difficult space between discovery and commercial development.

Some of the most important clinical experiments are precisely the ones conventional funding struggles to support: scientifically compelling, potentially transformative, but too early or too complicated for industry to assume the full risk.

"With a more diverse and larger set of funding, I think we could have run more of those difficult-to-fund clinical trials just to get proof of concept," he says—enough evidence to show that an approach works and allow pharma or biotechnology partners with greater resources to carry it forward.

He also believes cancer research needs to learn more directly from human biology.

Mouse models have been indispensable, Ramsdell stresses, but they cannot reproduce the complexity of tumours that have evolved inside human beings for years.

"We need to learn more from what happens in human models and human biology."

That means smaller, smarter clinical studies capable of generating biological insight earlier and a research

system prepared to move continuously between laboratory and patient.

Ramsdell has spent enough time in science to know that predictions about what cannot be done rarely age well.

Antibodies were once considered impractical drugs.

Cancer immunotherapy once occupied the margins of oncology.

Engineered immune cells once sounded impossibly complicated.

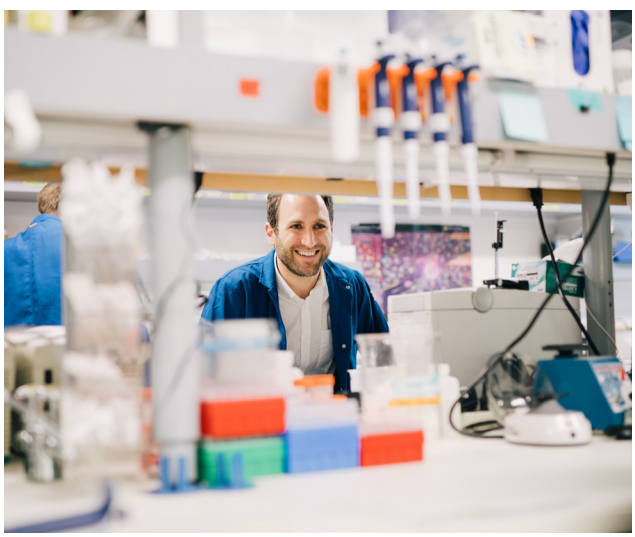
Today, each has changed medicine.

That history gives ambition a different meaning.

"Why is ambition a problem?" Ramsdell asks.

For cancer, perhaps the greater danger is not aiming too high.

It is accepting the limits of what is possible too soon.



Alexander Marson, MD, PhD | Center Director, Gladstone Institutes

From Discovery to Cure

As PICI enters its second decade, Ramsdell's perspective offers an important counterweight to the urgency surrounding translation.

Move faster, yes.

Build better pathways into the clinic.

Connect academia and industry.

Learn more from every patient and every clinical trial.

But do not mistake speed for the source of progress.

Everything begins with discovery.

The treatment that transforms cancer care a decade from now may already exist as an observation in a laboratory notebook. It may emerge from an experiment whose therapeutic implications are not yet apparent. It may come from a young investigator pursuing a question others consider too uncertain, too difficult, or too ambitious.

The task is to create an ecosystem capable of recognising that science—and then surrounding it with everything required to move it forward.

Ramsdell's hope for PICI's legacy is ultimately remarkably simple:

"Combining our forces, combining resources, combining talent and skills will bring medicines to people faster, more efficiently, and more effectively than the traditional one-company, one-drug approach," he says. *"We can make meaningful changes in people's lives."*

That is where Ramsdell's own journey and PICI's first decade converge.

Protect the freedom to discover. Create the conditions to collaborate. Learn from failure. And when biology reveals something that can change a patient's life, do not allow institutional boundaries to stand in its way.

The greatest contribution of a scientific institution may therefore not be a single discovery.

It may be creating the conditions from which discoveries continue to emerge and the path by which they can become medicines.

Because in cancer research, the distance between an unanswered biological question and a patient's future can span decades.

PICI was built to make that distance shorter.

And Ramsdell's story reminds us why that matters: we cannot always know which discovery will change medicine. We can only make sure that extraordinary science has the freedom to emerge and, when it does, every possible chance to reach the people waiting for it.

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Mind the Void

Translation is the New Frontier in Cancer Medicine

By Karen E. Knudsen

Oncology is enjoying an unprecedented era of discovery, wherein advances in genomics, immunology, synthetic biology, cell engineering, and computational science have fundamentally expanded therapeutic possibilities. While the pace of cancer research escalates, the mechanisms by which discoveries reach patients have not kept pace, and gaps are widening.

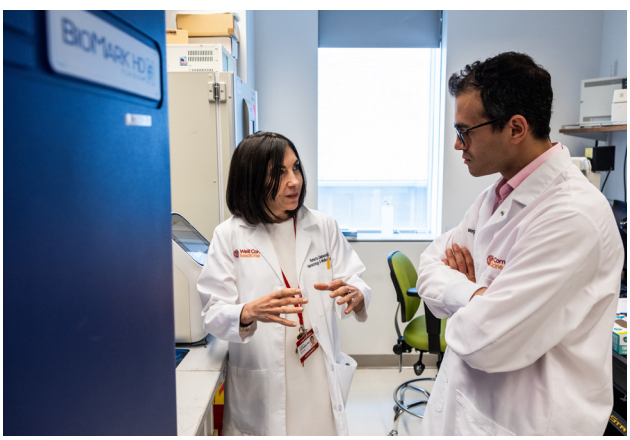
To address this need, the Parker Institute for Cancer Immunotherapy (PICI) was formed in 2016 with the goal to develop and increase access to breakthrough cancer therapies. Succinctly, PICI measures success by getting science to people, leveraging a unique model to fast-track translation and turn all cancers into curable diseases. Our call-to-action stems from urgency to solve for the longstanding and widening void in clinical translation.

Translational is the Bottleneck

Relative to every other stage of the oncology pipeline, discovery is the best supported. Federal grants, philanthropy, and institutional investment are constructed for hypothesis-driven laboratory research, and that design works as intended. Of the $7.2 billion available to the National Cancer Institute (NCI) in 2024, 43.3% was obligated to research project grants (1), while the National Clinical Trials Network, the nation's principal infrastructure for late-phase treatment trials, operates on ~$170 million per year, or 2% of the institute's budget (2). The consequence is measured in patients. Enrollment to cancer treatment trials, the most advanced form of cancer care, reaches only ~7.1% of adults with cancer nationally, and falls to ~4.1% at community programs, against 21.6% at NCI-designated comprehensive cancer centers (3).

None of this is a criticism of NCI, which is charged with advancing discovery and does so exceptionally well. The national research engine was constructed to generate hypotheses rather than to move the subsequent breakthroughs into patients. A discovery is therefore most vulnerable at the point at which the greatest promise is demonstrated. For example, advancing an immunotherapy from a preclinical study into a first-in-human trial requires GMP manufacturing, IND-enabling toxicology, biomarker qualification, and millions of dollars, representing work that grant mechanisms rarely support. This is the translational void, and two forces have deepened it.

The first is a contraction of early-stage capital. Venture investment has not left oncology, but has moved toward later stage assets wherein risk has already been retired. Last year, investors continued to favor Series B+ companies, with $17 billion invested vs. $11 billion for Seed and Series A financings. (5). Over the same interval, the average upfront payment for a Phase III candidate rose to $185 million from $53 million (4). Put simply, many investors require a clinical signal before funding the work. The second is that other geographies are stepping into the void. China's share of the global clinical pipeline has risen toward 30%, while the USA share has declined from 47% to ~36%. European share of life sciences R&D investment has also been on the decline, dropping by a quarter over the past 20 years (6). China-origin assets accounted for roughly half of global license-out deal value in 2025, and approximately one in three new compounds entering USA pipelines now originate with a Chinese company (7, 8). A substantial proportion is oncology, a benefit for cancer patients globally, but one that risks leaving patients in the USA and EU waiting longer for game changing cures.



Vered Stearns, MD | Weill Cornell Medicine

PICI: Re-Engineering the Translational Middle

By convention, translational medicine is viewed as the interval between laboratory discovery and clinical investigation. Translation is more accurately understood as a discipline in its own right, requiring coordinated integration of discovery biology, bioengineering, biomarker development, advanced manufacturing, regulatory strategy, and trial design. Few organizations possess all such capabilities, and transformative discoveries therefore stall despite compelling rationale. PICI was founded on the premise that this

"middle" must be constructed deliberately, using first design principles. Investigators across our national PICI institutes work alongside biotech founders, pharmaceutical partners, engineers, and investors under shared agreements governing intellectual property and data, wherein disciplines advance in parallel rather than sequentially. This allows us to step into that translational void, and take an active role in patenting and licensing breakthroughs to advance to clinical trials, and to incubate and form early-stage companies. Gains from our equity positions are returned back to the mission, allowing success to support the next wave of cancer breakthroughs. Thus, the end-to-end PICI model identifies and de-risks the most promising science, then supports concepts from discovery to company formation and clinical testing.

In the first decade, PICI helped catalyze >$4 billion in downstream investment and supported more than 1,000 investigators. Significance lies not in the capital, but in the demonstration that an engineered ecosystem repeatedly generates clinical impact. Dispatch Bio illustrates a recent example. CAR-T therapy transformed outcomes in B cell malignancies, yet has largely failed to replicate success in solid tumors, which represent approximately 90% of cancers. The reasons are biological: solid tumors rarely express a uniform, tumor-restricted surface antigen, expression is heterogeneous, and the microenvironment restricts T-cell trafficking. Rather than engineering increasingly complex cells to locate a target, Dispatch's "Flare" platform, which was built by bundling technology from multiple PICI sites, installs the target directly. In this platform, a tumor-selective virus delivers a modified BCMA antigen together with IL-18 and CXCL9, painting a synthetic target onto tumor cells while remodeling the microenvironment (9, 10). The tumor is thereby rendered recognizable to a CAR-T product already validated in the clinic.

Launched from the PICI ecosystem with $216 million in Series A financing, Dispatch paired that virus with a validated BCMA-directed CAR-T. FDA cleared the IND in January 2026, Fast Track designation followed, and the first patient with advanced gastrointestinal cancer has now been dosed (9, 11); a parallel program with CARsgen will evaluate the platform with a second CAR T (12). In sum, this platform went from discovery to dosing in under four years, which no single institution could have executed alone. This is the PICI model in action, and we remain highly enthusiastic about the capacity of this platform to revolutionize cancer care.

How to Win

In closing, cancer patients are increasingly benefitting from translation of fundamental discoveries that save lives. Cancer mortality rates in the USA declined 35% since the peak in 1991, and in the EU are predicted to decline around 7% this year from 2020 (13), thanks to scientific breakthroughs in prevention and cancer therapy. It is equally clear that the rate of translation, rather than of discovery, now determines the future of how many more patients benefit, and how quickly. We look forward to expanding the PICI model to further resource translation, and to therefore accelerate access to cancer cures.

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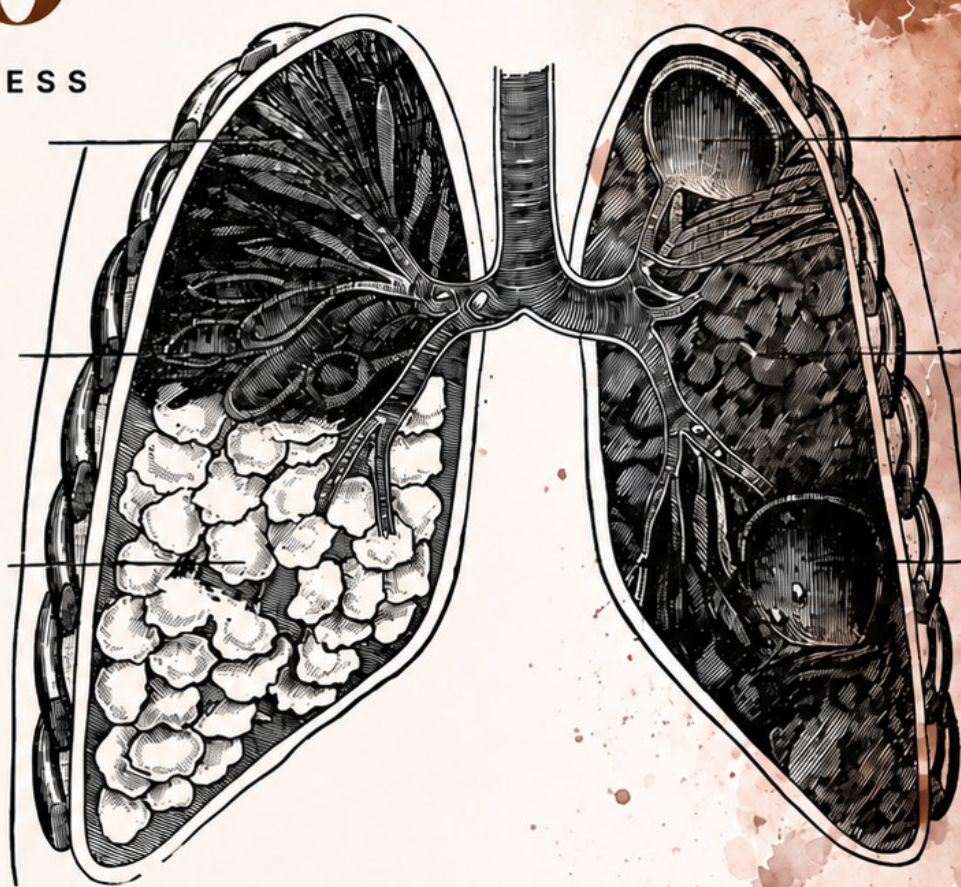

November 5

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The Innovation Engine

Beyond Discovery

John Connolly on Building the Path from Science to Patients

By Knarik Arakelyan

Some of the most important discoveries in cancer research never become medicines.

They are published. They are cited. They reshape scientific understanding. And sometimes, they stop there.

For John Connolly, PhD, Chief Scientific Officer of the Parker Institute for Cancer Immunotherapy (PICI), that gap between discovery and medicine is not simply a problem of science. It is a problem of structure.

Academia excels at generating ideas and uncovering the fundamental biology of cancer. Biotechnology excels at prioritising discoveries, assembling teams and turning promising science into clinical programmes. Pharmaceutical companies bring the scale required to move those programmes through pivotal studies and ultimately to patients.

But between those worlds lies a difficult space where potentially transformative discoveries can disappear.

PICI was built to occupy that space.

"You need to have a line of sight from that scientific discovery all the way through to the breadth of distribution and marketing," Connolly says.

Over its first decade, PICI has evolved beyond supporting fundamental cancer immunology into something more unusual: a scientific ecosystem capable of identifying discoveries, combining technologies across institutions, building companies around them, supplying capital, stepping into operational roles, and connecting those companies with partners capable of carrying therapies further.

At the centre of that model is a deceptively simple conviction:

Discovery is not enough if it never reaches a patient.

When Great Science Stops at the Journal

Connolly has been involved in biotechnology company building since before joining PICI. To him, the logic behind integrating company creation into the Institute's mission was apparent from the beginning.

PICI's ambition to make all cancers curable diseases was simply too large for any one part of the biomedical ecosystem to achieve alone.

Fundamental research and what Connolly calls *"blue sky science"* had to remain at the centre. Academia was uniquely suited to generating new ideas, interrogating mechanisms of action and resistance, and expanding understanding of cancer biology.

But academia was not designed to do everything that comes next.

Some discoveries, Connolly says, *"just sit in journals."*

The reason is not a lack of ambition. *"Everyone wants to cure cancer,"* he says. The problem is that the systems surrounding scientists reward different outcomes.

In major academic institutions, career progression is built around tenure, high-impact publications, novelty and discovery. Prizes, including the most prestigious prizes in science, recognise extraordinary contributions to knowledge.

"All of those are wonderful and they're great celebrations of one aspect of this," Connolly says. ***"But they aren't drugs."***

That distinction goes to the heart of the PICI model.

The objective is not to diminish discovery, but to build the structures capable of carrying it further—to turn biological insight into technologies and drug-quality programmes that can be tested in patients.

Because ultimately, Connolly says, ***"the clinic will tell us what works and what doesn't work."***

Building the Missing Middle

Traditional academic commercialisation often has a clear endpoint.

A university makes a discovery. Its technology transfers office licenses or partners the intellectual property. Responsibility for what happens next largely moves elsewhere.

PICI's philosophy is different.

"The core thesis of the Parker Institute is that you need to have line of sight," Connolly says.

That means remaining involved across the value chain from fundamental research through biotechnology development and ultimately toward pharmaceutical partnership and distribution.

The model deliberately draws on the strengths of each environment: academia generates creative, fundamental

PICI's 2025 Spring Scientific Retreat

science; biotechnology brings professional teams, project management, prioritisation and translational execution; pharmaceutical companies bring the scale and infrastructure necessary to move therapies through large clinical programmes and reach broad patient populations.

PICI's role is to connect those capabilities rather than allowing discoveries to be lost in the spaces between them.

It is, in effect, ***a new middle ground between discovery and scale.***

And PICI has built financial infrastructure to support it.

Through its venture philanthropy arm, the Institute can invest meaningful capital rather than simply providing small amounts of seed funding. Connolly estimates that PICI has deployed approximately $350–370 million over the past five years, contributing to more than $4 billion in value among companies invested in or spun out from the Institute.

But the significance lies less in the numbers than in what the capital enables PICI to do: stay involved.

"You have to be involved at all stages all the way across," Connolly says.

Building the Company, Not Just Funding It

Perhaps the clearest expression of that philosophy is PICI's approach to company creation.

The Institute does not necessarily wait for a fully formed company to arrive seeking investment.

Sometimes, it builds the company itself.

But the starting point is not the company. It is the science and often a problem revealed by the science.

Connolly and his colleagues work across the PICI network, speaking with investigators about the scientific problems they are trying to solve and following insights emerging from research and patients across the network.

A mechanism of resistance observed in the clinic, an unmet biological challenge or the need for an entirely new therapeutic modality can become the starting point. From there, PICI can work backwards from the biology: what would it take to solve this problem? What technologies, people and capabilities would need to come together?

One piece may come from one institution. Another may come from somewhere else. A third may complete the scientific proposition.

Sometimes, the solution already exists within those individual technologies. Sometimes, it emerges only when they are brought together. And when that combination creates a sufficiently compelling path toward patients, PICI can build a company around it.

The question is not simply whether the resulting story will appeal to investors. It is whether the combination can produce meaningful clinical impact.

"The real difference is identifying the combinations of best-in-class technology that really make that clinical impact," Connolly says.

That approach has led PICI to develop what he describes as a robust ***NewCo-build capability.***

"We'll come in on the ground and build the company," he says.

PICI can assemble technologies, take operational roles, recruit people, raise capital and move the company forward. As new investors and experienced industry leadership enter, the Institute can step back from those operational responsibilities while remaining connected to the company and its mission.

It also solves a practical problem. For an outside venture capitalist, assembling technologies from several universities can require multiple licensing agreements and considerable complexity.

PICI begins from a different position. Because it has supported research within its network and built relationships with participating institutions, it can identify complementary technologies earlier and bring them together more efficiently.

That ability to assemble the right science ***at the inception of a company*** may be one of the model's most consequential advantages.

Learning from What Does Not Work

PICI's innovation engine does not begin only with successful experiments.

Sometimes it begins with failure.

Cancer immunotherapy has produced extraordinary advances. It has also produced clinical trials in which treatments that appeared scientifically compelling did not help patients as expected.

For Connolly, those failures are not endpoints.

"You learn more from the failures than you do the successes," he says.

When a trial fails, PICI researchers can return to biology.

Why did one patient respond while another did not? What mechanism of resistance emerged? Did the tumour microenvironment suppress the immune response? Was the target inadequate? What did the patient data reveal that the original scientific model did not?

Researchers can interrogate samples and clinical results, identify mechanisms of resistance and use those insights to design the next technology.

The failed experiment becomes the beginning of another hypothesis—and potentially another company.

"Every trial in a company or an academia teaches us what the next company should be," Connolly says.

It is a powerful description of PICI's innovation cycle: ***discover, translate, test, learn and build again.***

At the EFO 2025

Close to the Source

PICI's involvement does not necessarily end once a company exists.

Portfolio companies remain connected to the scientific network from which they emerged, giving them access to investigators, key opinion leaders, scientific expertise and emerging technologies across the Institute.

Connolly calls it being ***"close to the source."***

Companies can see research developing across PICI, recognise technologies that may complement their portfolios and potentially license those innovations. PICI can remain involved at board level and reconnect companies with academic resources or pharmaceutical partners as technologies mature.

From fundamental research to company creation, board participation and business development, Connolly describes PICI's involvement simply:

"We're there from day one."

And that day begins long before a company exists.

At PICI's retreats, investigators present unpublished findings and discuss not only what experiments produced the expected result, but, often more importantly, what happened when they did not.

Those conversations can become the raw material for the next translational programme.

Betting on the Science

If PICI's first decade has taught Connolly one major lesson about translation, it is not to chase whatever the market currently finds fashionable.

"Don't just follow the investment trends," he says.

Instead, return to the science.

Identify mechanisms of resistance. Develop technologies that address them. And when the scientific rationale remains compelling, be prepared to keep supporting the work.

That requires a different time horizon from conventional investment. Some ideas need far longer than a standard investment cycle to mature.

PICI has to be willing to remain committed.

And if the ideal company does not yet exist?

Build it.

"If you want to build the perfect company, the company that has all the best-in-class technologies, you have to build it yourself," Connolly says.

That philosophy turns PICI's venture work into an extension of its scientific mission rather than a separate commercial activity.

The starting question is not simply: What company can we invest in?

It is: What scientific problem needs to be solved and what combination of people, technologies and resources gives us the best chance of solving it?

Rethinking What Academia Rewards

Connolly believes the implications extend beyond PICI.

As universities increasingly embrace entrepreneurship, they will also have to reconsider what they reward.

If an institution genuinely values scientists who build companies and translate discoveries, he argues, then time spent creating ventures, operating companies or raising capital should count meaningfully in academic career progression.

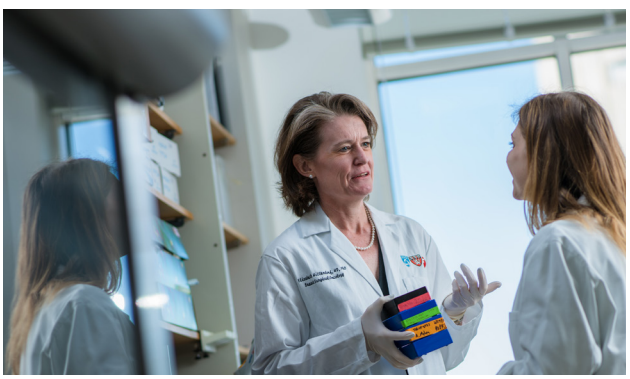
At present, those activities can sit awkwardly alongside traditional measures of academic achievement.

But their impact can be enormous.

For researchers pursuing entrepreneurship, company creation should not necessarily be viewed as a distraction from academic science, but as another potential expression of scientific impact.

New structures—whether venture studios or organisations inspired by models such as PICI—could make it easier for researchers to move discoveries into companies.

And institutions, Connolly argues, should celebrate that work.



Elizabeth Mittendorf, MD, PhD | Former Center Co-Director, Dana Farber

From Products to Systems

As PICI enters its second decade, Connolly is not content with predicting where cancer immunotherapy will go next.

"I think Parker Institute is defining that future," he says.

Defining it means asking questions that extend beyond today's therapeutic approaches.

Cancer vaccines are one example. Connolly is less interested in reproducing vaccines of the past than in asking a more fundamental question: what does a truly durable anti-tumour immune response look like?

From there, researchers can work backwards—reverse-engineering the biological requirements of durable immunity into new therapeutic strategies.

Artificial intelligence and systems approaches will also become increasingly important as researchers attempt to understand interactions that cannot be reduced to a single target or cell type.

For Connolly, this points toward a fundamental shift.

Cancer immunotherapy has often advanced through individual products: CAR-T cells, oncolytic viruses, checkpoint inhibitors and other defined modalities. But the boundaries between those approaches are increasingly dissolving.

Checkpoint blockade, CAR-T, cancer vaccines, cytokines, myeloid-directed therapies, metabolism and delivery are not independent therapeutic worlds; each acts on and is shaped by other components of the immune response.

The future may therefore require moving from ***immune products to immune systems.***

The next generation of cancer immunotherapy may depend less on optimizing any one modality in isolation and more on understanding how these interventions can coordinate multiple arms of immunity. That means asking not only why a particular therapy succeeds or fails, but how resistance emerges across the immune system as a whole and how combinations of technologies can be designed to overcome it.

Instead of manipulating one component, researchers will need to understand how multiple cell types interact, how durable immune memory is established, how different therapeutic interventions reshape one another's effects, and how the immune system can be engaged as a coordinated whole against cancer.

That is the frontier Connolly finds most exciting: *"Moving out of product development into systems immunology, truly engaging the immune system to fight cancer."*

The Innovation Engine Comes Back to Discovery

For an interview so deeply concerned with companies, capital and translation, Connolly's answer to the question of legacy is striking.

He returns to fundamental science.

PICI's greatest contribution, he believes, may ultimately be a deeper mechanistic understanding of the relationship between cancer and the immune system throughout disease and treatment.

Crack that problem, and entirely new therapeutic possibilities could emerge not only for PICI, but for the field.

That is why the Institute needs immunologists, cancer biologists, systems scientists and other specialists working together as a network.

And it is why PICI's model cannot be reduced to a research consortium, venture fund or company builder.

It is an interconnected system in which each stage informs the next.

Fundamental biology generates discovery.

Discovery generates technologies.

Technologies are combined into companies.

Companies carry therapies into patients.

Clinical experience reveals resistance and failure.

And those lessons return scientists to biology with better questions.

Ten years after PICI was created, Connolly's vision of innovation therefore begins and ends in the same place: ***deep science.***

The difference is everything PICI has built around it.

Because a discovery can change what scientists understand.

A therapy can change what happens to a patient.

The challenge and the purpose of PICI's innovation engine is to make the distance between those two as short as possible.

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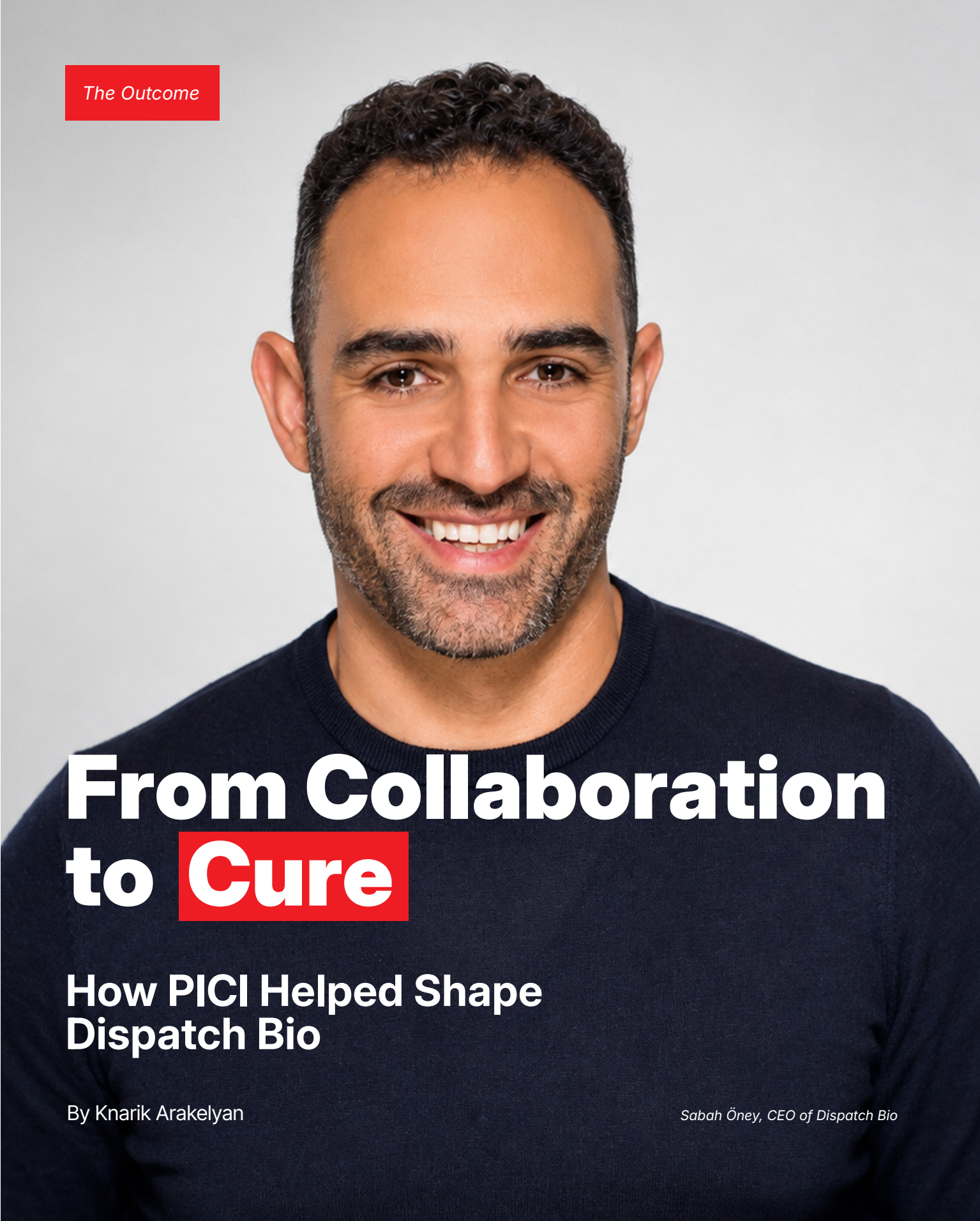


From Collaboration to Cure

How PICI Helped Shape Dispatch Bio

By Knarik Arakelyan

Sabah Öney, CEO of Dispatch Bio

Ten years after the Parker Institute for Cancer Immunotherapy set out to rethink how cancer science moves from discovery to patients, Dispatch Bio offers a revealing test of that vision. Its CEO, Sabah Öney, reflects on why bold science so often dies between the laboratory and the clinic, what PICI changed, and why the ultimate measure of innovation is not discovery itself, but whether it gives patients another chance at life.

Cancer research does not suffer from a shortage of ideas.

The harder problem is what happens to them next.

A discovery may be scientifically compelling, yet remain trapped inside a laboratory. Technologies developed at different institutions may never be brought together. Intellectual property can become fragmented. Investors may decide an idea is too early, too complicated or too risky. Years can pass before something with genuine therapeutic potential reaches a patient if it ever does.

For Sabah Öney, Chief Executive Officer of Dispatch Bio, this is precisely why the story of the Parker Institute for Cancer Immunotherapy (PICI) matters.

Dispatch did not emerge from a single laboratory, institution or discovery. It grew from scientists, technologies and intellectual property distributed across multiple institutions, brought together through PICI around one of oncology's most stubborn challenges: how to reproduce in solid tumours the deep and durable responses immunotherapy has achieved in some blood cancers.

Ask Öney whether Dispatch could have existed in the same form without PICI, and there is little hesitation.

"It wouldn't exist."

The statement is striking, but it also goes to the heart of the experiment PICI began a decade ago: ***what becomes possible when collaboration is not simply encouraged, but deliberately built into the architecture of cancer innovation?***

A North Star: Deep, Durable Responses

Öney describes Dispatch's mission in unusually ambitious terms.

"Our goal is to bring deep durable responses, which we call cures, to patients suffering from solid tumors," he says. *"We haven't changed that mission since we started the company because it's been such a strong North Star for us."*

That ambition confronts two major barriers that have limited immunotherapy in solid tumours.

The first is specificity.

Many solid tumours arise from epithelial tissues, making it difficult to identify targets that clearly distinguish malignant cells from healthy ones. The result can be a narrow therapeutic window: a treatment powerful enough to kill cancer may also damage normal tissue.

Dispatch's first objective, Öney explains, is therefore to widen that window—to make it possible to attack tumour cells aggressively while sparing healthy tissue.

The second barrier is the tumour itself.

Solid tumours create physical and chemical defences that prevent the immune system from clearing them. Structural barriers can restrict immune-cell penetration, while suppressive signals can deactivate T cells that do reach the tumour.

For Öney, overcoming both problems is essential if solid-tumour immunotherapy is ever to reproduce the deep responses seen in some blood cancers.

Dispatch's platform is designed to tackle both.

The company uses an oncotropic virus—designed to replicate selectively in cancer cells—to place a synthetic antigen on those cells. Rather than relying only on naturally occurring antigens that may also appear on healthy tissue, the strategy aims to create a more clearly tumour-specific target.

Öney describes it much more vividly:

"You can paint these tumors with any antigen you want."

At the same time, the approach is designed to break through the physical and chemical barriers surrounding the tumour, creating conditions in which immune cells can penetrate, remain active and attack.

In animal models, Öney says, the effect can be dramatic. *"Our tumors basically go squishy. They melt."*

But destroying the existing tumour is only part of the ambition. The longer-term goal is to create immune memory, so that if malignant cells return, the immune system can recognise and attack them again.

That is what turns tumour shrinkage into something potentially much more consequential: durability.

A Company That Could Not Have Been Built in One Place

The scientific idea behind Dispatch is sophisticated.

So was creating the company.

According to Öney, the Dispatch concept was conceived within the PICI ecosystem. Sean Parker and John Connolly helped assemble the scientists behind it and created a forum where they could openly discuss their ideas and determine how the different scientific pieces might fit together.

But the challenge soon moved beyond science.

The technologies sat across **four** (it's three institutions and four IP estates) **separate institutions and four intellectual-property estates.**

Without a coordinating framework, Öney argues, those discoveries might have led to several separate companies trying to solve different pieces of the same problem or might never have been assembled effectively at all.

PICI helped bring them together.

"It's really hard to do a startup with one institution, one IP, one scientific founder around one idea," Öney says, *"let alone trying to do it with three to four institutions, numerous scientific co-founders."*

Then came another critical ingredient: early capital.

Dispatch began with a **$15 million seed investment from PICI** while the company was still essentially an idea. That support allowed it to begin consolidating intellectual property, hiring staff, running experiments and building a product roadmap without losing time.

"We basically incubated at Parker Institute," Öney says.

Only when the programmes were ready to move towards preclinical and clinical development did Dispatch become more independent and attract other investors and industry partners, including ARCH and BMS.

PICI's contribution, then, was not simply scientific.

It helped build the bridge from idea to company.

Redefining What Impact Looks Like

For Öney, Dispatch represents only one part of PICI's wider contribution.

He sees Sean Parker's understanding of networks as fundamental to the Institute's model: assemble exceptional scientists, create mechanisms for sharing ideas and intellectual property, and give genuinely new or risky ideas a chance to develop before conventional structures are prepared to support them.

Öney makes an unusually provocative assessment of the Institute's impact, even arguing that, relative to its resources, he believes PICI has had greater impact on cancer research over the past decade than far larger organisations such as the US National Cancer Institute.

It is his personal assessment, but what matters is how he defines that impact.

Not simply by publications.

Not simply by drugs entering the clinic.

Not simply by companies created or money raised.

He also points to scientists who were early in their careers when PICI began and who are now becoming leaders in the field.

For Öney, that combination—supporting fundamental science, established investigators, emerging researchers, clinical translation and company creation is central to the model.

Basic research remains indispensable, he stresses. But understanding cancer is only one part of the journey. Science must also be translated into therapies and, eventually, into treatments capable of reaching far more patients than an academic programme alone can serve.

That creates a different way to judge scientific success.

Not only:

What did we discover?

But:

What happened to the discovery next?

The Abyss Where Bold Ideas Die

Between academic discovery and an investable biotechnology company lies a dangerous gap.

Öney calls it an **abyss.**

A new scientific concept may sound extraordinary, but investors understandably want evidence. Historically, investigators could develop enough preclinical data in academia to attract venture capital.

Öney believes that the environment changed markedly after 2021–2022, as biotechnology investors became more risk-averse and increasingly gravitated toward programmes with clinical evidence.

But by definition, an idea that already has clinical data is no longer truly at the beginning of innovation.

That creates an obvious problem:

Who funds genuinely new science before it becomes safe enough for everyone else?

Öney has encountered the paradox repeatedly.

"I've spoken to more than 120 investors."

Many, he says, publicly declare that they want *"new, bold, innovative stuff."*

Then someone actually presents something new, bold and innovative.

"And they say, 'Oh, it's risky.'"

The irony makes him laugh, but the consequence is serious.

Everyone celebrates innovation once it succeeds. Far fewer are willing to support it while failure remains a real possibility.

Öney believes PICI helped Dispatch cross *"the abyss where most of the companies would have died"*—providing resources early enough, assembling the right scientists, and helping attract additional investors once the concept had matured.

His conclusion is emphatic:

"There isn't another organization like them in existence today."

Changing Innovation and Accelerating It

Has PICI fundamentally changed how innovation happens, or simply made it faster?

For Öney, it has done both.

The Institute created an environment where risky ideas are not merely tolerated, he says, but encouraged and where status does not determine whether someone is allowed into the conversation.

"You don't need to be a Carl June to be able to talk about these ideas in front of an incredible audience."

Researchers can be at very different stages of their careers and still be "respectfully listened to" and invited to contribute.

That changes culture.

Resources change speed.

PICI can support an investigator academically, Öney notes, and can also support a company emerging around the science. The distance between having an idea and being able to act on it becomes shorter.

Looking back, Öney admits that he would not have predicted the Institute's trajectory ten years ago.

As a nonprofit attempting something unconventional, perhaps it would "make some noise," he thought.

A decade later?

"Beyond all expectations."

Why Now?

Dispatch was founded at a moment when Öney believes the scientific landscape of solid-tumour immunotherapy had fundamentally changed.

Dispatch Bio's Executive Staff

The previous decade had brought repeated failures. But failure also produced knowledge.

Researchers understood much more about why many previous attempts had not worked. Gene and cell therapies had advanced. New technologies had become available. And an exceptional group of scientists, entrepreneurs and investors had assembled around the Dispatch concept.

Öney remembers walking into a room with Sean Parker, John Connolly, ARCH's Robert Nelsen and Steve Gillis, and scientists including Carl June, Andy Minn, Chris Garcia and Kole Roybal.

The message was simple.

The technologies existed.

The idea existed.

The capital existed.

"The time is right."

Öney had other opportunities under consideration. But after seeing the concept and spending hours talking with Parker and others around the table, he dropped them.

Within weeks, he says, he was convinced.
"It was definitely the right group of people," Öney recalls.

"And we had the right ingredients to be able to swing for the fences and do something that can really make a material impact for patients that need these therapies the most."

Incremental improvements remain essential, he stresses. But Dispatch offered an opportunity to aim for something larger.

To imagine going to a patient with no other options and saying that perhaps a deep response could last ten years. And at the end of that decade?

"We're going to call you cured."

"That," Öney says, *"was really attractive to me."*

You Don't Stack Risk

Scientific ambition, however, has to be matched by operational discipline.

One of the most important lessons Öney has learned in building Dispatch is that breakthrough biology alone does not create a medicine.

The company deliberately combined an experienced board with a leadership team that, as he puts it, blends *"youthful enthusiasm with a lot of experience."*

The aim was not simply to generate impressive animal data, get quickly into patients and sell the company.

Dispatch, he says, is being built for the long term.

That requires a disciplined approach to development.

Öney describes the concept of the ***"minimum viable drug":*** identify the minimum set of components necessary to create meaningful impact for patients and eliminate whatever adds unnecessary distraction, delay or risk.

Whenever possible, clinically validated components are used. Regulatory considerations are incorporated early. The team continuously asks how it can move quickly while taking the least unnecessary risk.

His operating principle is succinct: *"You don't stack risk."* Drug development is already uncertain enough.

That philosophy helped Dispatch move from the concept for its first drug to dosing the first patient in under 20 months, according to Öney. Further programmes are already progressing behind it.

He credits the company's leadership team across science, technology, medicine and people operations with remaining aligned around a basic question: ***What do we need to do to get where we need to go?***

Bench to Bedside is Not Enough

PICI has often described its model as moving innovation from **bench to bedside to marketplace.**

For Öney, that final step is essential.

Asked whether company creation and successful translation should become defining measures of success for leading cancer research institutions, he responds immediately:

"It has to be. It has to be. That's the way to do it."

Academic cancer centres possess enormous strengths: exceptional scientists, patient data, clinical infrastructure, resources and the ability to conduct trials.

But developing medicines at scale demands additional capabilities.

Manufacturing.

Regulatory strategy.

Financing.

Product development.

Commercial execution.

Those capabilities may come from a company born directly from a research institute or through a close partnership with biotechnology or pharmaceutical organisations.

What matters is efficiency.

Öney argues that a promising discovery should not sit on a shelf for years before the organisations capable of developing it finally become involved.

Drug development is already filled with what he calls "known unknowns and unknown unknowns."

"The last thing you need is more friction thrown into the system."

The handoff between academic science and drug development therefore cannot be treated as an administrative afterthought.

It is part of translation itself.

"There is Magic in a Village"

What could other research institutions learn from PICI? Öney returns to the network.

Not the largest possible network.

The right one.

He describes PICI retreats that bring together established leaders with some of the brightest emerging investigators, all encouraged to share ideas openly.

"There is magic in a village."

If the network grows too large, he argues, that quality can disappear.

But when the community remains intimate enough for relationships to form and when intellectual risk-taking is encouraged rather than punished—the dynamics of collaboration change.

Industry also has to be part of that community.

Öney notes that when he attends or speaks at PICI, he does not feel treated as an external biotechnology executive. He is simply part of the Institute's ecosystem. That kind of alignment matters.

"The success of the drug is the success of everyone."

Scientists.

Institutions.

Companies.

Investors.

And ultimately, patients.

The principle underlying it is even simpler:

"The faster we get to patients, the better it is for the

world."

Not every idea will succeed.

In fact, Öney acknowledges that most experimental ideas will not become successful drugs.

That uncertainty is intrinsic to biotechnology.

But risk can be shared more intelligently and the strongest ideas can be given a better chance to move.

Not Thousands. Millions.

Looking ahead to the next decade of cancer immunotherapy, Öney defines Dispatch's hoped-for contribution not only in terms of efficacy, but scale.

The ambition is not to deliver deep, durable responses to hundreds of patients.

Or even thousands.

"I think our greatest contribution is going to be bringing deep, durable responses not to hundreds or thousands of patients, but hundreds of thousands to millions of patients a year."

That means two challenges cannot be left until the end of development: ***affordability and manufacturability.***

Dispatch is already working on technologies intended to move from thousands of patients to potentially hundreds of thousands or millions.

Investors sometimes question whether sophisticated therapeutic platforms can ever be manufactured in enough volume to make economic sense.

Öney understands the scepticism.

His response is not simply to argue against it.

It is to build the technology that demonstrates scale is possible.

For him, that is not merely a commercial problem.

It is part of the therapeutic mission.

A medicine cannot transform cancer care if most patients who need it can never receive it.

Another Chance at Life

Near the end of our conversation, the language changes. We have discussed intellectual property, scientific networks, venture capital, organisational structures, manufacturing and drug development.

Then Öney talks about the patients.

Dispatch is now dosing people with stage IV metastatic gastrointestinal cancers.

"These patients have no other path left to them," he says.

Their prognosis, he adds, can be devastatingly short. Dispatch is enrolling them because they need another option now.

Suddenly, every abstract discussion about "translation" becomes concrete.

For those patients, whether four institutions can align their intellectual property is not simply an administrative question.

Whether investors are prepared to finance risky science is not simply a financial question.

Whether a programme moves forward in two years rather than seven is not merely a measure of operational efficiency.

It is time.

And time means something different when a patient has very little of it left.

Öney asks us to look beyond Dispatch.

The company, he stresses, is only *"a very small portion of the overall story."*

Imagine, he says, the different approaches emerging across the PICI ecosystem reaching patients who have exhausted existing therapies.

Then imagine them succeeding.

Moving earlier in treatment.

Eventually becoming first-line.

A decade from now.

Two decades from now.

Öney believes that some therapies used routinely in the future may ultimately trace their origins back to work being done across the PICI network today.

Diseases with terrible prognoses might become chronic. And perhaps, in some cases, curable.

"We're going to call you cured," he imagines clinicians being able to say.

And then comes the phrase that gives all the science, infrastructure and risk its meaning:

"Giving those patients another chance at life."

Öney is certain about what that would represent.

"I think that is going to be—I know it—it's going to be the legacy of the Parker Institute."

Dispatch Bio Executive Leadership Team

Ten Years In

A tenth anniversary naturally invites a retrospective.

How many discoveries?
How many papers?
How many clinical programmes?
How many companies?
How much outside investment?

All are legitimate measures of progress.

But Sabah Öney's story suggests another question:

What became possible because PICI existed?

Dispatch Bio offers one answer.

Scientists working across institutions were brought together.

Separate intellectual-property estates were assembled around a shared scientific vision.

An ambitious concept received capital when conventional investors might have considered it too early.

A company was incubated until the science was ready to move independently.

A development philosophy was built around speed without unnecessarily stacking risk.

And today, that science has reached patients for whom new options matter urgently.

None of this guarantees that Dispatch's therapies will succeed. Clinical evidence must determine that. Nor does Öney suggest that every idea emerging from PICI will become a medicine. Most experimental approaches will not.

That uncertainty is inseparable from genuine innovation. But perhaps one of PICI's most consequential achievements over its first decade has been creating an environment in which ambitious ideas are at least given the chance to make the journey.

From one scientist to another.

From one institution to several.

From academic discovery to company.
From company to clinic.

From thousands of patients, potentially, to millions.

Sometimes the breakthrough is the science.

Sometimes it is the courage to take the risk.

And sometimes it is the system that allows exceptional science, people, capital and execution to meet at exactly the right moment.

For the patient waiting at the end of that journey, the distinction may not matter.

What matters is that the journey was possible at all.

The Patient Journey Across a Decade

"I Was There"

Mary Elizabeth Williams and the Immunotherapy Revolution

Mary Elizabeth Williams, whose participation in an early Phase I immunotherapy trial for metastatic melanoma became part of a transformative chapter in cancer treatment

By Knarik Arakelyan

From an experimental Phase I trial to a complete response, Mary Elizabeth Williams reflects on survival, scientific progress, and what the next decade must deliver for patients.

Mary Elizabeth Williams' daughter is sitting just a few feet away when the conversation turns to 2011.

Williams pauses. Her voice catches.

"Being able to sit here in a room with her...is the greatest gift in the world."

Fourteen years earlier, she did not know whether she would ever see this young woman grow up.

Williams, a journalist whose work has appeared in Salon, *The New York Times* and the *Los Angeles Times* and author of a Series of Catastrophes & Miracles: A True Story of Love, Science, & Cancer, was first diagnosed with melanoma in 2010. A year later, the disease returned at stage IV, spreading to her lungs and soft tissue. With few conventional treatment options remaining, she entered an early Phase I immunotherapy trial at Memorial Sloan Kettering Cancer Center under Dr Jedd Wolchok.
She achieved a complete response and has been cancer-free since 2012.

Her experience would place her at the beginning of one of oncology's defining transformations: the emergence of immunotherapy from an experimental idea into established cancer treatment. In 2016, Williams spoke at the launch of the Parker Institute for Cancer Immunotherapy (PICI). Ten years later, her story offers a rare view of that revolution from someone who lived it from the inside.

When There was Almost Nothing Else

When Mary Elizabeth entered the trial, immunotherapy was far from the familiar part of oncology it is today.

"There were pretty much no other options," she recalls.

Her cancer was progressing rapidly. Surgery could offer little relief and no cure. Chemotherapy was unlikely to control metastatic melanoma. She knew almost nothing about clinical trials and little about immunotherapy.

"It was really a big question mark," she says. *"And also it's a question mark at a time when you're thinking, how am I going to survive? Am I going to survive? "*

There was no certainty to make the decision easier. What she had was trust.

Mary Elizabeth remembers her first conversation with Dr Wolchok. Instead of beginning with the protocol, he began with her.

"Tell me about your life. Tell me who you are."

They talked about her children, her goals and what mattered to her. The team believed she was a good candidate, and a biochemist friend who had been following developments in the field encouraged her to take the opportunity.

Williams entered the trial with what she describes as "hope and trepidation."

"When you get penicillin, you kind of know what's going to happen," she says. *"When you get immunotherapy in 2011, you don't know what's going to happen."*

Becoming Part of the Data

What happened next would change not only Williams' life, but her understanding of what it means to participate in research.

She became one of the first complete responders in the small Phase I trial.

Years later, reading the published research, she recognised herself behind the numbers.

"I am represented in that data," she says. *"That data represents human lives and human stories."*

For Williams, participating in the trial became one of the most meaningful achievements of her life. She had entered an experiment without knowing whether it would save her. She then watched the approach become part of a broader transformation in cancer treatment.

She sees herself as one link in a much longer chain—one that includes scientists who spent decades pursuing immunotherapy, patients who participated in earlier studies, and many who never lived to see the field succeed.

To have been there as that history began to turn, she says, is "beautiful."

Today, strangers contact her with their own immunotherapy stories. Friends have received treatments that were once experimental. And her experience has changed the direction of her own life: she advocates for clinical trial participation and is involved in work around expanded access to investigational therapies.

"Being a tiny part of it," she says, has been *"beyond my dreams."*

At MSK on last day of treatment

When Immunotherapy Went Mainstream

In 2016, Williams was invited to speak at PICI's launch.
Tom Hanks introduced her.

"It's crazy," she says, laughing at the memory.

But beneath the celebrity and excitement was something far more consequential.

For decades, cancer immunotherapy had struggled for scientific credibility. Mary Elizabeth remembers Dr Wolchok describing how immunotherapy researchers once occupied the smallest rooms at major oncology meetings—until, suddenly, they were filling the biggest.

At PICI's launch, she felt that transition happening around her. A field once regarded with scepticism was attracting attention, investment and belief.

"This is not a fringe idea anymore," she remembers thinking. *"This is front page news."*

A decade later, perhaps one of the most profound changes is that immunotherapy has entered the language of cancer itself.
When Mary Elizabeth was diagnosed, cancer treatment was still widely synonymous with chemotherapy. Today, patients, families and clinicians know there are other possibilities.

"Chemo is not the only game in town anymore," she says.

But awareness must extend beyond patients. Doctors need to know what trials and treatments exist, and healthcare facilities need the resources to deliver them. Progress, Mary Elizabeth argues, depends on the entire healthcare ecosystem knowing what is possible.

That matters because no one knows when they may suddenly need that knowledge.

"The more people know about immunotherapy before they need to know, the better I think their odds are."

Mary Elizabeth Williams at the launch of the Parker Institute for Cancer Immunotherapy in 2016

The Patients Who Do Not Become Miracles

Williams' response was extraordinary.

That is precisely why she is careful about how her story is told.

"I know that you're talking to me because I had the best possible outcome," she says. *"I am the person you want to see representing immunotherapy. And I am also not the whole story."*

For many patients, immunotherapy does not work. Others cannot tolerate it. Some exhaust every available option.

Mary Elizabeth has lost close friends and family members to cancer. She knows how painful it can be when the dominant cancer narrative celebrates the survivor while those whose disease progresses become invisible.

"Getting sick feels like a failure," she says. *"And then not responding to treatment feels like a failure."*

But patients have not failed because a treatment failed them.

Williams believes people who do not respond must remain part of the story—visible in cancer organisations, public messaging, research conversations and the way medicine talks about progress.

Hope matters. But hope should never require pretending that every breakthrough works for everyone.

"We need to make room at that table for the people who are having different outcomes."

The same principle shapes how Mary Elizabeth believes breakthrough science should be communicated.

Medicine cannot promise certainty where none exists.

"We can't make promises," she says. ***"We can offer hope."***

That requires clinicians and researchers to become more comfortable with perhaps the most difficult words in medicine:

We don't know.

For Mary Elizabeth, acknowledging uncertainty is not an abandonment of hope. It is part of treating patients honestly and with dignity.

Mary Elizabeth with her best friend, who died of cancer

Innovation Means Nothing If Patients Cannot Reach It

The scientific transformation Mary Elizabeth has witnessed has created new possibilities.
It has not made them equally accessible.

Clinical trials remain concentrated around major research centres. Community clinicians may not know about available studies or may be unable to offer them. Smaller healthcare facilities may lack the infrastructure and resources required. Geography, transportation and other practical realities can determine whether a patient ever reaches a potentially transformative opportunity.

"You shouldn't have to live in Manhattan [or] LA... to get quality treatment and to get access to clinical trials," Mary Elizabeth says.

Then she reduces the problem to its simplest form:

"Immunotherapy doesn't work if it doesn't get in your body."

For Williams, that means the next decade of progress cannot be measured only by the number of new therapies developed.

Success must also mean **options and autonomy.**

Mary Elizabeth with her daughters during treatment

She wants authentic informed consent: information delivered honestly, in plain language and through formats people can actually understand. She wants clinical trials designed for people with comorbidities and protocols flexible enough to recognise transportation difficulties, mobility limitations, caregiving responsibilities and work.

"Most of your life exists outside of the clinic," she says.

Mary Elizabeth remembers the assumption that she could simply appear at a particular hour on a weekday because the healthcare system required it. But patients have lives they are trying desperately to preserve.

"It's my body. It's my cancer. It's my illness. It's my children. It's my job."

For Mary Elizabeth, patient-centred research begins

with a deceptively simple question:

What do you need?

Not every need can be accommodated. But asking changes the relationship. It means seeing the person before the disease.

The Next Battle: Trust

If Mary Elizabeth could stand again before PICI's scientists today, her first message would be simple:

"Never give up."

She is alive because generations of scientists, clinicians and patients did not give up—even through decades of experiments that failed, treatments that disappointed and patients who died before the breakthrough arrived.

But the challenge facing the next decade is no longer scientific alone.

Williams worries deeply about misinformation and declining trust in science.

"People are dying of misinformation," she says.

Scientific breakthroughs cannot improve lives if patients no longer trust the people producing them. In an era of deepfakes, false cures and seemingly certain answers delivered through social media, defending evidence and rebuilding trust have become part of the work of cancer medicine itself.

"If we can't reach people, we can't treat them."

Mary Elizabeth also points to pressures on research funding and a broader environment in which scientists, physicians and pharmaceutical companies can increasingly be portrayed not as people trying to solve difficult problems, but as adversaries.

For her, the answer is not to retreat from uncertainty or complexity. It is to fight misinformation with truth.

"If we're trying to cure cancer, we have to acknowledge that we also have to cure ignorance. We won't get it done if we don't."

The Greatest Gift

Williams knows she is an outlier.

Or, as she puts it, she is becoming ***less of one.***

There was a moment in 2012 when she felt almost alone—one of a tiny number of people experiencing an extraordinary response to an experimental therapy.

Today, she sees a growing population of people whose cancers have disappeared or who are living longer with disease that might once have been a death sentence. Cancer itself, in some cases, is becoming something people can live with rather than something that immediately defines the end of life.

She is profoundly grateful for the science that allowed her to become part of that change.

But science was only part of what she received.

"I had great science. I had great research. I also had great human beings who talked to me like a person, who cared about me, who knew what the stakes were for me."

Because of that, she trusted them.

"If you don't have trust, you can't get anything done."

Ten years after PICI's launch, perhaps that is Williams' clearest definition of what progress should ultimately deliver: extraordinary science, yes, but science that reaches people, tells them the truth, respects the lives they are trying to preserve and treats them as human beings whatever their outcome.

"We all deserve that," she says. "*That's what I want for everybody—what I got."*

And then there is her daughter, sitting just outside the frame.

The child Mary Elizabeth once feared she might never see grow up is now visiting from London.

Williams smiles.

"How lucky am I that I get to tell this story?"

The Patient Journey Across a Decade

When Innovation Reaches the Patient

Ariana Nakata

on Living with Metastatic Cancer, Clinical Research, and the Promise of Therapeutic Vaccines

By Knarik Arakelyan

For scientists, translation is the journey from discovery to treatment. For Ariana Nakata, it has meant something far more tangible: staying alive long enough to see discoveries that once existed only in laboratories become options she could actually pursue.

Diagnosed with breast cancer in 2018, Ariana has navigated recurrence, metastatic disease and successive treatments as her cancer adapted around them. At Washington University in St. Louis, where she is cared for by William Gillanders, she participated in a study of an individualized therapeutic cancer vaccine—an area of research being advanced by investigators including Robert Schreiber, whose work is supported by the Parker Institute for Cancer Immunotherapy (PICI).

Her experience offers another perspective on the promise of cancer innovation. Breakthrough science matters. But so do the difficult miles between a breakthrough and the patient who needs it.

For Nakata, some of those miles have been literal.

When Cancer Came Back

Her cancer story began in 2018, when Nakata felt a lump in her breast. She was diagnosed with ER-positive, HER2-negative breast cancer and underwent a lumpectomy, chemotherapy and radiation, followed by hormonal therapy.

For two years, life began returning to normal.

Then, during the COVID-19 lockdown in 2020, severe back pain appeared. It was initially treated as a musculoskeletal problem. When restrictions eased, Ariana decided to have an MRI before taking a family road trip.

Three hours outside Los Angeles, the phone rang.

Her cancer had returned.

"I had to pull over, tell my husband, tell my kids, then we had to drive back three hours to Los Angeles."

The disease eventually became metastatic, involving her bones, liver and lungs. Treatments worked and then stopped working. Her cancer adapted.

That experience fundamentally changed how she thinks about the disease.
"Cancer is a really individualized and complicated disease, and it needs to be looked at in a personal way."

Searching Beyond the Standard Path

As treatments failed, Ariana began searching.

She explored emerging therapies, sought opinions across institutions and discovered how difficult it can be for a patient to understand the full landscape of cancer research.

"The medical industry as it stands is very siloed," she says.

Patients, she believes, are often left to connect the dots themselves—between oncologists, research centres, clinical trials and emerging approaches.

"You have to kind of be a fierce advocate for yourself and direct what that journey is."

Around 2023, that search brought her into contact with PICI and its Chief Scientific Officer, John Connolly. Together, they began looking across the clinical research landscape for potential options. Eventually, that search led to Washington University and an individualized therapeutic cancer vaccine.

For Nakata, the significance went beyond any single therapy. It offered something she believes cancer care too often lacks: a wider view of the patient, the science and the possibilities available across institutions.

The "Dry Ice Hustle"

Getting to the vaccine was not simple.

An individualized vaccine requires tumour material so researchers can identify antigens against which an immune response might be directed. But Ariana discovered that the healthcare infrastructure was not designed to easily move her pathology specimen from a hospital to a research laboratory.

Her solution was decidedly low-tech.

She collected the specimen herself and shipped it on dry ice.

She calls it ***"the dry ice hustle."***
"It's my tissue sample," she remembers thinking.

The episode is almost humorous in retrospect, but it exposes something more serious: sophisticated experimental medicine can still depend on patients personally navigating remarkably basic logistical barriers.

It ultimately took approximately two and a half years for Nakata's vaccine to be developed, approved and delivered.

Her path was highly individualized: Nakata describes the vaccine study as a "one of one" clinical trial that required FDA compassionate-use clearance because of her metastatic disease.

That distance between scientific possibility and practical accessibility has become one of the defining lessons of her experience.

"You have to have absolute tenacity," she says. "You have to use every tool in the kit of your life to push forward—to be curious, to be patient, to have a positive attitude and to ask questions."

For Ariana, that tenacity also means building the right team—sometimes an unconventional one—around the patient: clinicians who are willing to question, investigate and keep looking for solutions.

With Dr William E Gillanders, MD who developed the personalized DNA cancer vaccine that Ariana is receiving

When Research Becomes Real

Every month, Nakata flies from Los Angeles to St. Louis with her father, Kouji.

They have developed a ritual: arrive on Sunday, have dinner at the same tapas restaurant, stay at the same hotel and spend the following day at the hospital.

There, blood is collected, she meets the clinical team and receives the vaccine.
Administration involves electroporation—brief electrical pulses used as part of the vaccine delivery process.

The first time caught her completely by surprise. Her leg jumped. The unlocked hospital bed moved.

Now, she knows what to expect.
More importantly, she knows why she is doing it.

Nakata has been receiving the vaccine for almost a year, and she reports that testing has shown an immune response to 24 of 59 antigens evaluated. She is also receiving a newer-generation antibody-drug conjugate.

For a patient who has spent years reading about experimental medicine, seeing evidence that her immune system is responding carries enormous meaning.

Asked what it means to see scientific research move from the laboratory into something she can actually access, her answer is immediate.

"It means everything."

It is, she says, the real-life culmination of scientists *"asking questions and trying to find solutions."*

Perhaps there is no simpler definition of successful translation.

A scientific idea has reached a human being who needs another option.

Ariana Nakata with her father, Kouji, who accompanies her for treatment.

Access is Part of Innovation

Yet Ariana knows that reaching innovation requires resources many patients simply do not have.

The vaccine itself is covered through research. The surrounding costs are another matter.

Because the study requires travel from California to Missouri, she must contend with flights, hotels and medical expenses associated with receiving treatment outside her insurance network. Blood tests, physician visits and pre-medications can generate costs that are

not necessarily covered.
"Not everyone can afford to fly out, get a hotel, [and] pay for those costs out of pocket," she says.
For Nakata, this is not peripheral to the future of clinical research. ***If a breakthrough exists but patients cannot reach it, translation remains incomplete.***

She also wants patients to have something she struggled to find herself: a place where they can understand research opportunities across institutions and connect with someone capable of helping them navigate those options.

"It's always the information highway," she says.

She imagines a patient portal accompanied by knowledgeable guidance—a resource that could provide practical information as well as emotional support for people trying to make sense of an overwhelming research landscape.

Staying Alive for What Comes Next

There is an unusual dimension to living with metastatic cancer during a period of rapid scientific progress.

Time becomes both adversary and possibility.

Ariana has watched treatments emerge that were unavailable only a few years earlier. That knowledge shapes how she approaches uncertainty: ask questions, build the right team, challenge assumptions and keep searching.

Because something that does not exist today may exist tomorrow.

She also sees her participation in research as extending beyond herself. What researchers learn from her immune response may help shape treatments for patients who come after her.

And she believes society has already demonstrated how quickly medicine can move when urgency, resources and collective purpose align.

"When the whole world is together with unlimited resources, trying to solve an international problem that affects everyone, things get done," she says.

Like COVID, Cancer, she argues, deserves that same urgency.

"It's not one person's problem. It's not one nationality. It is a worldwide international problem that has to be solved."

Ariana Nakata with her father, Kouji, who accompanies her for treatment, in their favorite restaurant in St. Louis BAR MORO in Clayton

Ten Years From Now

PICI's first decade has been defined by an effort to accelerate the movement of cancer immunotherapy from discovery toward patients. Ariana's story shows both how far that movement has come and how much remains unfinished.

Science can produce a vaccine tailored to the biology of one patient's tumour. Yet that same patient may still need to transport her own tissue on dry ice, search across institutions for clinical trials, travel thousands of miles for treatment and fight with insurance over the costs surrounding it.

The next frontier, therefore, is not discovery alone.

It is making discovery reachable.

When asked what she hopes today's research will mean for someone receiving a metastatic cancer diagnosis ten years from now, Ariana does not hesitate.

"I hope that there's no such thing as metastatic cancer in ten years."

Then she goes further, imagining a future in which cancer vaccines might ultimately prevent disease.

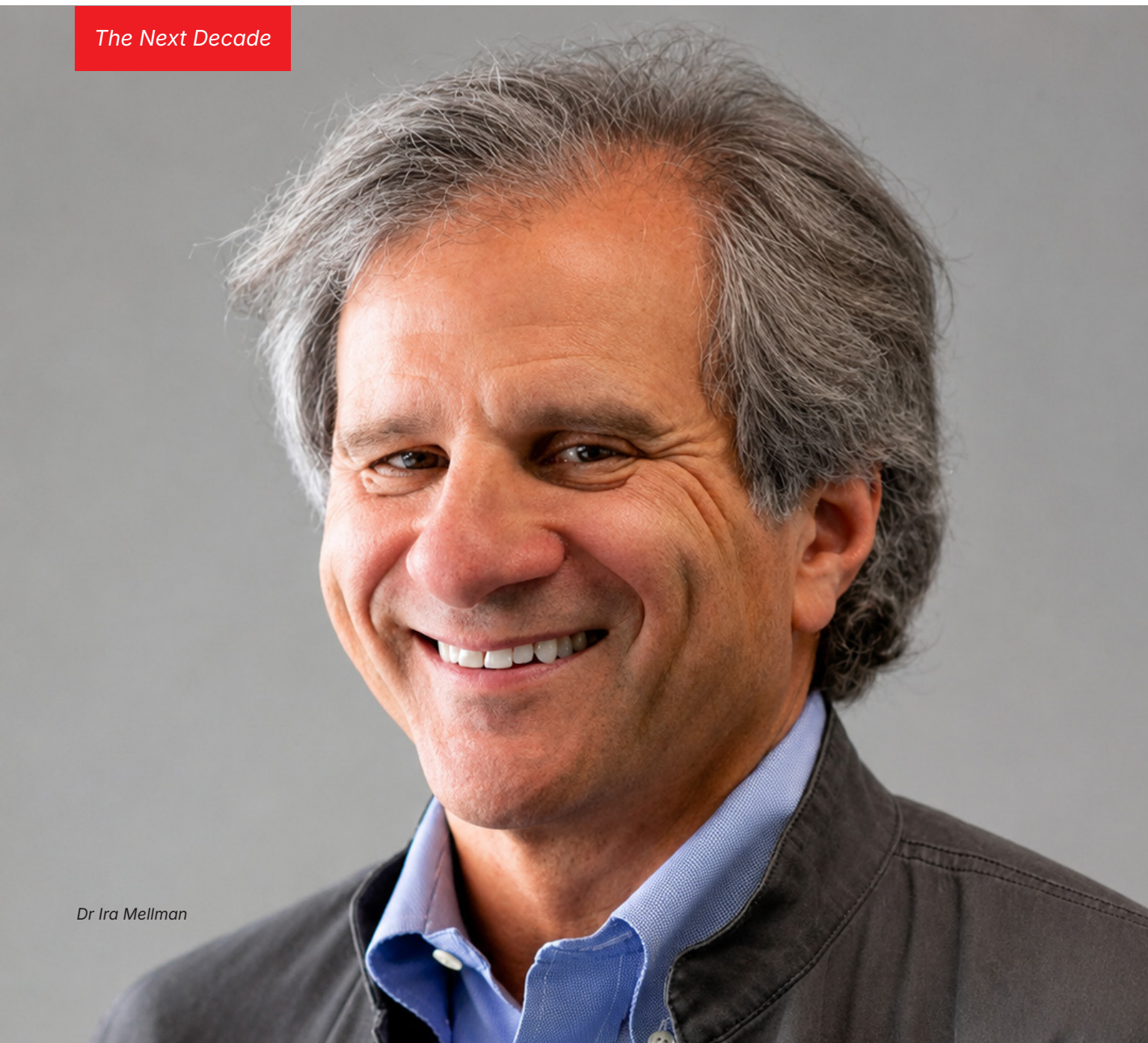
"That's my hope."

PICI 2036

Defining the Next Decade of Cancer Immunotherapy Innovation

By Ira Mellman

The Next Decade



Dr Ira Mellman

Ten years ago, the Parker Institute for Cancer Immunotherapy (PICI) was founded with an ambitious goal: to develop breakthrough cancer therapies and accelerate their access. Over the past decade, our collaborative model has helped advance CAR and TCR cell therapies as well as therapies that directly modulate the immune response-a number of which have supported the launch of biotechnology companies built on PICI's groundbreaking science.

While the field has made tremendous progress, the promise of immunotherapy is far from fully realized. Too many cancers still lack effective immunotherapy options, and significant scientific challenges remain before these treatments can reach every patient who could benefit.

As PICI begins its second decade, we're turning our attention to the next generation of scientific challenges in the field. By focusing our network on the questions with the greatest potential to change patient outcomes, we hope to help shape where cancer immunotherapy goes next.

Here are our scientific priorities for the decade to come.

Priority 1: The Next Generation of Cell Therapy

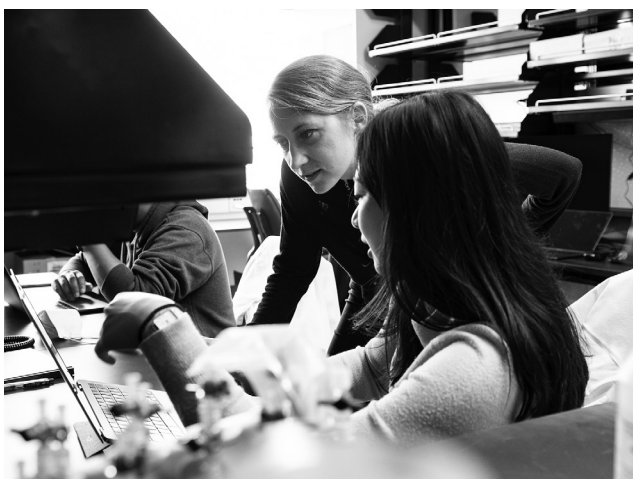
T-cell therapies have transformed the treatment of several blood cancers, but achieving similar success in solid tumors remains one of the field's biggest challenges. Solid tumors often lack tumor-specific targets, are difficult for immune cells to penetrate, and develop mechanisms that limit long-term treatment responses.

To address these barriers, PICI is investing in next-generation approaches that move beyond today's standards. Our priorities include developing simpler logic-gate strategies, advancing neoantigen-driven cell therapies, increasing T-cell potency, and improving engineered cells' ability to function within the suppressive tumor microenvironment.

Priority 2: Advancing Neoantigen-Driven Therapies, Cancer Vaccines, and Synthetic TCR Platforms

Tumor-specific neoantigens offer an opportunity to develop more precise, personalized immunotherapies. PICI is expanding its focus on T-cell receptor (TCR)-based therapies capable of recognizing intracellular tumor antigens while leveraging AI-assisted synthetic biology to design and identify more effective anti-tumor TCRs.

Cancer vaccines remain another major area of focus. Recent clinical advances have reinforced their therapeutic potential, but more research is needed to understand how these therapies work and how they can be optimized for individual patients. PICI will continue supporting vaccine research as both standalone and combination therapies to accelerate the next generation of personalized immunotherapies.



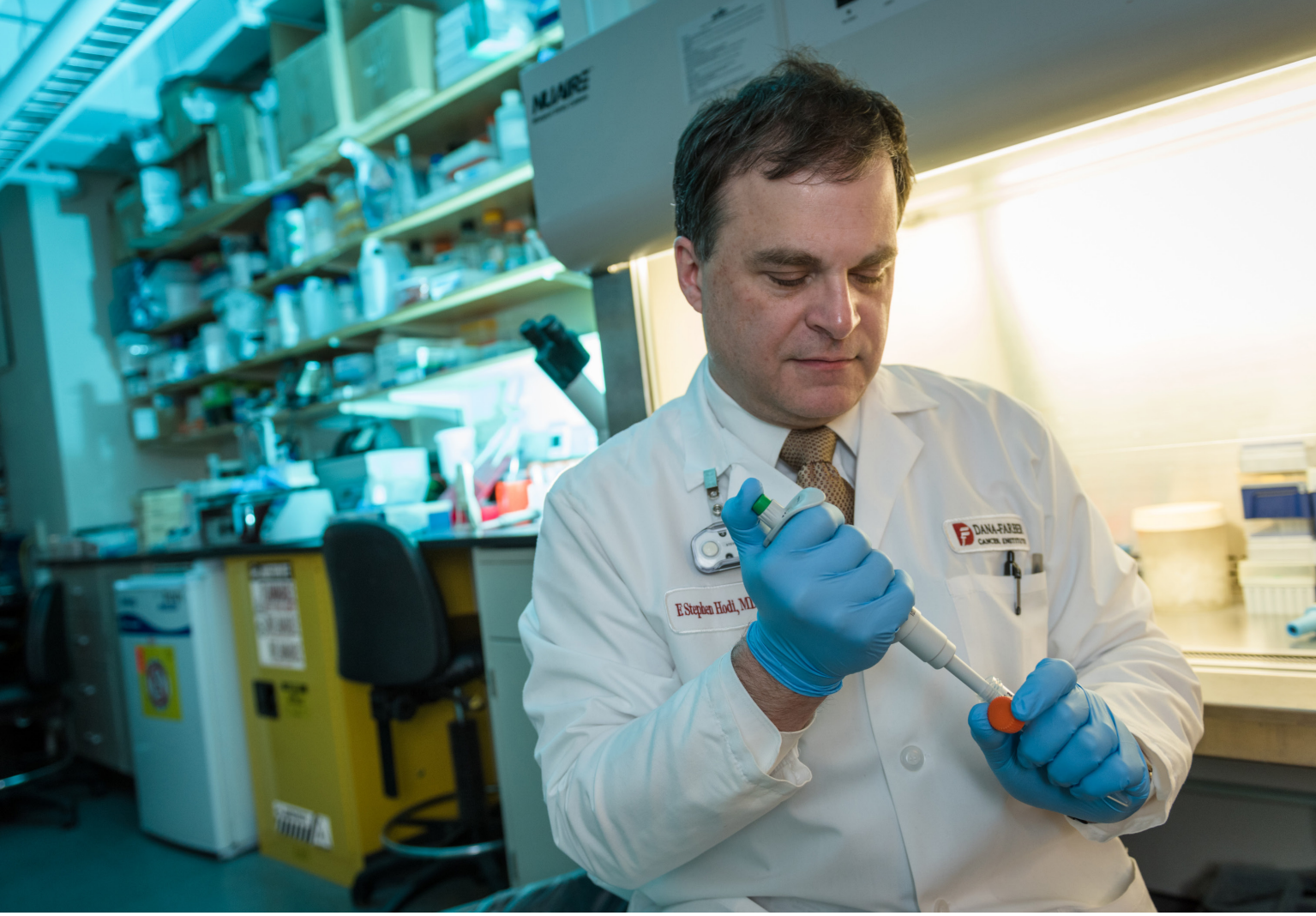
Working process

Priority 3: In Vivo Immune Engineering and Off-the-Shelf Modalities

Engineering immune cells directly inside the body has the potential to make cellular immunotherapies more accessible.

Researchers across the PICI Network are exploring in vivo engineering approaches that deliver CAR constructs, TCRs, and other cellular enhancements directly to immune cells. This includes innovative technologies such as non-viral DNA delivery systems and cell-free T-cell engineering to create simpler, off-the-shelf therapies.

Scalability, affordability, and commercial feasibility will remain central to this work so that promising scientific



F. Stephen Hodi, Jr. MD, Dana-Farber

advances can ultimately reach more patients.

Priority 4: Systems Immunology and Tumor Microenvironment Modulation

The tumor microenvironment remains one of the biggest barriers to effective immunotherapy. Overcoming these suppressive mechanisms will require combining systems immunology, AI and computational modeling, and large-scale patient data to better understand how tumors interact with the immune system.

PICI researchers are investigating strategies to modulate the tumor microenvironment by overcoming suppressive cytokines, identifying and reprogramming suppressive immune cells, and applying artificial intelligence and machine learning to increasingly complex biological datasets. Expanding these efforts with clinical trial data and advanced modeling will help generate the insights needed to guide future discoveries.

Looking Ahead

The next decade presents an opportunity to tackle some of the toughest challenges in cancer immunotherapy.

By focusing the power of the PICI Network on the highest-impact scientific questions, challenging investigators to push beyond today's approaches, and deepening collaboration across institutions and disciplines, we aim to help define the future of cancer immunotherapy and, ultimately, improve outcomes for more patients.

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From left to right-Sean Parker, Founder and Chairman, PICI and Karen E. Knudsen Chief Executive Officer and Board Member, PICI

Engineering the Next Wave

PICI Strategy For the Second Decade of Accelerating Curative Cancer Therapies

By Karen E. Knudsen

Fifteen years ago, a diagnosis of advanced melanoma or lung cancer offered little hope of long term survival. Today, some patients treated with immunotherapy are living years, even decades, beyond what earlier odds would have predicted. The data are clear: cancer science saves lives, and immunotherapy has carried a disproportionate share of that advance. A modality relevant to fewer than 2% of patients with cancer in the USA as recently as 2011, now shapes the standard of care across a widening set of tumor types. By 2023, an estimated 56.6% of patients with cancer in the USA were eligible for checkpoint inhibitor therapy, against 1.5% in 2011, while the estimated proportion deriving a response rose from 0.1% to 20.1% (1). These data highlight that immune-based modulation has become a general strategy rather than a niche, but there is still much more to be learned. The question before the field is therefore not whether immune-based treatment works, but how rapidly the next generation of breakthroughs can be moved into patients. The Parker Institute for Cancer Immunotherapy (PICI) was built to answer this question.

What the First Decade Produced

PICI was founded in 2016 on a premise that remains uncommon: "translation" is a discipline of its own, requiring coordinated integration of discovery biology, bioengineering, advanced manufacturing, regulatory strategy, and trial design. Few organizations hold all of those capabilities, and transformative science therefore stalls despite compelling rationales. The first decade of PICI tested whether that middle could be deliberately constructed. Our work produced a network of 13 institutions and more than 1,000 supported investigators, 126 inventions licensed or optioned, and 17 biotech ventures that have raised in excess of $4 billion. PICI's returns from these investments fund the

next wave of science.

The Future is Now: Immunotherapy as the Backbone of Cancer Treatment

Immune redirection now extends well beyond checkpoint blockade. Tarlatamab, a DLL3-directed T-cell engager, extended median overall survival to 13.6 months against 8.3 months for chemotherapy in relapsed small cell lung cancer (2). Antibody-drug conjugates have moved out of late-line salvage into curative-intent settings, wherein trastuzumab deruxtecan was approved in 2026 for early-stage HER2-positive breast cancer in the neoadjuvant and adjuvant setting (3). Engineered T-cell receptor therapy and CAR-T are being extended to solid tumors, though absolute gains to date remain modest (4). Together, these modalities identify the immune system as the durable delivery mechanism for cancer control. Our focus areas for the coming decade are accordingly distributed across four promising directions.

PICI 2036: Key Priorities Toward Curative Therapy in Solid Tumors

Sharpening of PICI goals retain the objective of developing curative therapies for solid tumors and concentrates effort as follows:

First are next generation approaches for cell therapy. These will need to address resistance with new approaches targeting multiple tumor antigens as well as engineered enhancements to overcome the suppressive tumor microenvironment. Second, we will enhance our focus on therapeutic cancer vaccines, with an eye toward stand-alone use, early interception of disease, and in combination with cell therapy, alongside approaches that reduce cost and timing of manufacture. Additionally, T-cell receptor-directed therapy against tumor neoantigens is a priority. Neoantigens are polyclonal by nature and are the targets recognized by tumor-infiltrating lymphocytes, wherein engaging the peptide-MHC complexes those receptors recognize represents the theoretically optimal approach to immunotherapy. Third, in vivo engineering, wherein constructs are delivered to pre-specified cells within the patient rather than manufactured ex vivo. Autologous production is cumbersome, expensive, and inconvenient for patients, and remains the principal reason cell therapy has not scaled. Finally, deconvoluting the tumor microenvironment (TME), which both promotes and suppresses T-cell responses, is a major goal. Efforts to target the TME have disappointed to date, reflecting how little is understood of the complex underlying mechanisms. The opportunity is correspondingly large, as relieving immunosuppression would benefit checkpoint blockade, vaccines, and cell therapy alike.

Where the Future Lives: Therapeutic Vaccines and Designed Antigens

This second priority warrants elaboration, given recent advances and their potential to revolutionize cancer care. In resected high-risk melanoma, an individualized neoantigen therapy combined with pembrolizumab produced five-year recurrence-free survival of 68.8% against 49.1% for pembrolizumab alone, a 49% reduction in the risk of recurrence or death (5). In resected pancreatic cancer, wherein five-year survival remains approximately 13%, vaccine-induced T cells have been tracked for up to six years; seven of eight patients who mounted an immune response were alive at four to six years (6). Within the PICI network, investigators reported at ASCO 2026 that a personalized neoantigen vaccine in newly diagnosed glioblastoma was associated with median overall survival of 36.9 months in MGMT-methylated disease against 25.3 months for historical controls (7).

None of this should be mistaken for a solved problem. No therapeutic cancer vaccines were approved by the FDA from 2011- 2025, and 2026 delivered discontinued programs and missed endpoints. Decades of prior failure are now best understood as consequences of poor platforms, poor immune monitoring, and poor antigen selection rather than of a flawed premise. Limitations largely exist around target selection. The Tumor neoantigen SeLection Alliance, convened by PICI with the Cancer Research Institute, established the field's benchmark by

demonstrating that only 37 of 608 candidate peptides, or 6%, proved immunogenic (8). We built the yardstick that measures how far this field has to go, which is why closing that gap is a defining PICI priority. Our integration with the Cancer Vaccine Coalition in April 2026 was undertaken to accelerate exactly this work.

Computational design is also helping to close gaps. De novo designed binders to peptide-MHC complexes, including the tumor antigen PRAME, were generated against antigens lacking any experimental structure and activated T cells in eight of eleven designs (9). The caution is well documented: benchmarking published in 2026 found that T-cell receptor specificity prediction degrades to near-random performance on unseen epitopes (10). Design is ahead of prediction, and that distance will close with better data rather than with better algorithms alone. Synthetic and computationally designed TCR-like binders are accordingly where a PICI focus will reside.

Building the Data on Which the Next Decade Depends

Each of these priorities depends on data the field does not yet have. The target-selection problem will require longitudinal, standardized measurement from patients receiving treatment. Trial enrollment remains heavily concentrated in academic centers, wherein a model trained exclusively on those populations will encode that same imbalance. Building datasets that reflect the treated population rather than the studied one is therefore a precondition for everything above, and it is work PICI is positioned to convene across our network.

The Path Forward

PICI is prepared to resource these priorities, utilize our unique model to de-risk technical breakthroughs, and continue building and financing companies geared toward cancer cures. Partnerships will continue to figure prominently in the next wave of success. Moreover, key changes in the translational landscape could further accelerate progress. First, a return of risk capital to an earlier stage, prior to development of a clinical signal. Second, pre-competitive data sharing, thus closing the target-selection gap through shared and standardized datasets. Third, increased capacity of regulatory and reimbursement frameworks to anticipate and accommodate products manufactured for a single patient.

In closing, this is a moment of remarkable opportunity for patients. Durable remission, once exceptional, is now achievable across a widening set of cancers, and we can design therapies against targets that were effectively invisible a decade ago. What remains is to build the ecosystem that carries those therapies to patients at the speed the biology now permits. PICI exists to do precisely that, and we welcome colleagues across academia, industry, philanthropy, and government to join us. Every person facing a cancer diagnosis deserves a therapy designed to cure, delivered in time to cure. Turning all cancers into curable diseases has been our ambition from the beginning; the difference now is that it has become a credible one. We intend to get there.

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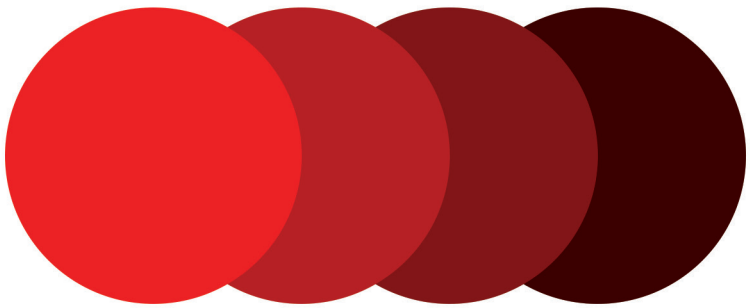
President, Emirates Oncology Society



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