

2021

ANNUAL REPORT



tech transfer for nebraska



tech transfer for nebraska

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2021: YEAR OF THE STARTUP

MESSAGE FROM THE PRESIDENT AND CEO

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technology transfer and commercialization
for the University of Nebraska Medical Center
and the University of Nebraska at Omaha

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Michael Dixon

Michael Dixon, PhD

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The seven new startups created in 2021 breaks UNeMed's third-oldest record, when UNeMed built six new companies around UNMC innovations back in 2010.

As the dust settled on 2021, we all settled into what appears to be a new normal.

I'm pleased to report that, for our little corner of the universe, this new normal is more cosmetic than anything else. Most of our staff continue to work remotely. One-on-one meetings are rare, and getting the whole team under one roof, at the same time, now feels like a significant challenge.

But when we look at what can be done under these new normal circumstances, it's clear that impediments to office hours and in-person meetings will not stop the pace of innovation. Our researchers, students and staff have been chugging along at a steady clip and have defied all expectations. And UNeMed's team of tech transfer professionals continue to match that pace.

Just look at new invention disclosures to get an idea of what I'm talking about.

Back in 2018, UNMC and UNO inventors set a new record for inventions with 111 new disclosures. Never before had our inventors cracked the century mark. Since then, we've crossed that line every year. Remarkably, that includes the 105 notifications we received in 2020, at the height of a generational pandemic; and still another 105 inventions received during the last fiscal year ending in 2021. The 105 inventions in 2020 and 2021, are tied for second-most in our 30-year history.

Adding the 101 inventions received in 2019, we're in the middle of a four-year streak of 100-plus innovations, which we expect to continue building well into the future.

Getting a huge stack of innovative, cutting-edge innovations during a once in a lifetime pandemic should be the biggest news of the year...but it isn't.

As most in the technology transfer business might tell you, disclosing an invention is only the beginning.

The road ahead for all inventions still includes background research to determine if it is novel and protectable. Nondisclosure agreements and meeting with potential commercialization partners who can afford the required development, intellectual property protection, regulatory approval,

and dozens of other milestones and hurdles along the way. Too many good inventions fall by the wayside along the journey, but more and more of our technologies are hanging in there.

That might speak to the kind of innovators at Nebraska and the quality of their ideas. I think we can quantify that a little bit if we look a little closer at some of our other core metrics.

Just as our invention numbers are maintaining all-time highs, we are also beginning to see a record number of issued patents. Last year we saw our oldest company record fall when we secured 26 U.S. patents. The previous mark was 24, set more than two decades ago in 1997.

Of course, when I speak to the so-called "quality" of our innovations that has nothing to do with my opinion. We think all of our patented inventions are outstanding; however the market determines that value, not us. And the market is telling us something.

When we look at our portfolio of technologies, I'm most proud that more than 60 percent have been licensed to a commercialization partner that has invested in continued development and commercialization.

A majority of our partners are well-established companies, big and small. However, an increasing number are brand new startup companies that are finding more fertile ground for success in our own back yard.

In this last fiscal year we helped to develop and license new technologies to a record seven startup companies.

That might not sound impressive when taken in a vacuum, but it takes on more shine when you look at the growing successes we're beginning to see in some of our more established startups.

Virtual Incision, for example, has raised more than \$100 million since its founding. The surgical robotics company is on the precipice of redefining what we call minimally invasive surgeries, and could be

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2021: YEAR OF THE STARTUP

Virtual Incision announces \$46 million Series C funding round

Virtual Incision, a surgical robotics startup company based on University of Nebraska innovations, closed a successful \$46 million Series C financing round, the company

announced in a 2021 press release.

“I feel fortunate to have worked with Virtual Incision over the years as they developed this technology into a successful platform,” UNeMed president and CEO Michael Dixon said. “It’s a great example of University innovation, and the time and energy it takes to develop a novel idea into a product. The success of today took more than a decade to build, and I’m excited for their growth over the next 10 years as their platform technology moves into the surgical rooms where it can have a direct impact on patients.”

University of Nebraska-Lincoln robotics engineer Shane Farritor, PhD, and former University of Nebraska Medical Center surgeon Dmitry Oleynikov, MD, co-founded Virtual Incision in 2006. Their collaboration resulted in a surgical device that could transform traditionally open, highly invasive surgeries into minimally invasive procedures.

The cash will finance Virtual Incision’s latest push toward full regulatory approval for its flagship device, the MIRA Surgical Platform. MIRA stands for “miniaturized in vivo robotic assistant.”

MIRA weighs about two pounds, giving it a distinct advantage over other surgical platforms that require the dedicated space of an entire room. Surgical staff can easily move Virtual Incision’s robot from room-to-room as needed, even for complex procedures like a colon resection.

A typical colon resection surgery today requires a large incision so the surgeon can remove a portion of a patient’s lower intestine. It requires months of recovery and rehabilitation. But a skilled surgeon using Virtual Incision’s MIRA system can shave that recovery time to mere days.

“The ability of MIRA to successfully perform colon resection—a challenging procedure in minimally invasive surgery that requires multi-quadrant anatomical access and significant robotic strength—demonstrates the huge potential of the platform,” Dr. Farritor said in the press release. “This funding milestone represents a step forward in our goal to deliver a miniaturized solution for robot-assisted

Virtual Incision *continues on page 4*



Radux helps those who help you

The type of innovative technologies blossoming at Nebraska startup company Radux Devices brings to mind, paradoxically, a 100-year-old Vaudeville routine.

Patient: Doctor, it hurts when I do this.

Doctor: Then don't do that.

The humor there is perhaps best described as the measure of empathetic annoyance at such "medical" advice. The advice isn't necessarily bad, it just doesn't do much to solve the core issue of pain.

How a century-old comedy act dovetails with cutting-edge technology speaks to the very nature of innovation. In this case, Greg Gordon, MD, an interventional radiologist, suffered pain every time he did his job.

He couldn't very well stop doing his job, as an old Vaudevillian might have him do. Discomfort, chronic pain, debilitating back injuries and even dangerous radiation exposure are all part and parcel to an interventional radiologist's existence.

But here's the thing: It didn't have to be. Dr. Gordon just created a better way to "do that" so it wouldn't hurt anymore.

He solved the core problem.

And now he has a revenue-generating company built around those ideas.

That's all innovation is.

Not all innovations are as potentially transformative as Dr. Gordon's devices, but they all seem to share that same DNA.

The problem

Interventional radiology or fluoroscopic procedures actively use x-rays to help guide physicians as they place things like catheters and stents. Using x-rays are also helpful to monitor blood flow and find blocked arteries in real time.

The trouble with fluoroscopic procedures is two-fold.

First, they're flooded with—surprise—x-ray radiation. That is not a big problem for most patients. They might see that level of radiation only a few times in their entire lives.

The physician, however, might perform several of those procedures in a single day. All that radiation adds up, so physicians must take great care to limit their exposure.

The interventional radiologists who perform these procedures wear heavy, lead-lined protective garments, which lead to the second part of the problem: musculoskeletal injuries.

While wearing a 15- to 30-pound apron, the physicians often try limiting their exposure by standing in ways that keeps them as far removed from the x-ray field as possible. That usually means leaning in odd and uncomfortable angles. It means using less-than-preferred techniques just to avoid feeling the stabbing pains and dull aches that seem to grow more intense with each passing day.

The Standard of Care

The standard of care in cardiac fluoroscopic procedures is to access the patient's aorta through the radial artery in the arm. The left is the easier route because the artery on that side has one less curve to navigate. However, using the left radial artery is often awkward and uncomfortable because most surgeons are right-handed. A right-handed doctor using left arm access usually requires leaning into the radiation field, over the patient, who themselves are often positioned in awkward and uncomfortable positions.

Many physicians in cardiac fluoroscopic procedures can easily avoid the discomfort—and its potential for long-term injury—in favor of using the right arm or the femoral artery in a leg.

The problem with the right arm is one of human anatomy. The right side has that extra curve, which is even more complicated with shorter or older patients. The arteries in shorter people make tighter curves, and older, more fragile patients often have arteries that are more delicate. A physician might struggle for half-an-hour to finesse a catheter into position from the right arm. The same procedure on the same patient might take only five minutes when performed from the groin.

Femoral access may be no more complicated than from the left radial artery, but going through the groin is well documented for carrying a significantly higher risk of complications and failures.

Radux continues on page 13





2021: YEAR OF THE STARTUP

Vireo expansion to add jobs, economic impact to Omaha area

Vireo Resources broke ground on a \$50 million expansion that could create as many as 300 new jobs for the area, according to a recent report in the Omaha World-Herald.

Vireo is a Tennessee-based nutritional supplement company that offers products based on researcher Jonathan Vennerstrom's novel work with new creatine formulations at the University of Nebraska Medical Center. One of the products invented at UNMC is known by the trade name CON-CRET, and it helps improve strength and endurance while reducing recovery times from athletic activities. Another Vireo product based on UNMC innovation is AminoActiv, which promotes joint and muscle health.

Early success led to Vireo opening a manufacturing facility in Plattsmouth in 2008, and eventually expanded into a 10,000 square-foot facility in 2011. The latest expansion broke ground right next door, and will hold an additional 32,000 square feet. Altogether, the facilities will all fit within Vireo's 10-acre campus and could eventually add another 100,000 square feet, according to the World-Herald report.

Vireo currently employs about 40 people, but that could grow to more than 300 once the expansion is complete in about seven years.

The economic impact of the expansion, however, is not limited to just larger facilities or an injection of new jobs. As the World-Herald reports:

"...added jobs should help fill new housing proposed for Plattsmouth, including a \$10.3 million project to convert the old high school near Eighth and Main Streets. An Omaha developer's plan, which includes public incentives, calls for 25 lofts in a renovated high school and 16 apartments in two newly constructed buildings.

"The adjacent Old Blue Devil stadium, which hasn't been used as a school district football field since the 1980s, would be transformed into single-family housing under a plan the city is trying to work out with a developer. The mayor said he expects up to 45 dwellings to be built.

"We've got 200 to 300 jobs coming to this area,' [Plattsmouth Mayor Paul] Lambert said. 'Those people have to have some place to live.'"

Virtual Incision continued from page 2



laparoscopic surgery, regardless of the site of care."

In August 2020, Virtual Incision announced the "world's first surgery using the MIRA Surgical Platform." Michael Jobst, MD, performed a right hemicolectomy at Bryan Medical Center in Lincoln. The procedure was part of an ongoing clinical study that could lead the U.S. Food and Drug Administration to approve the device for use in humans.

According to the issued release, the funding will also support a "research and development pipeline" that include "a family of mini-robots optimized for additional operations such as hernia repair, gallbladder removal, hysterectomy, sleeve gastrectomy and others."

The successful funding round was led by Endeavour Vision and Baird Capital, with participation from returning investor Bluestem Capital and others, according to the announcement.

Including this most recent raise, Virtual Incision has now attracted about \$100 million in investments since its initial founding in 2006.

Ensign secures \$2.03m for new arthritis treatment, ProGel

A startup company founded by UNMC College of Pharmacy scientist Dong Wang, PhD, landed in 2021 a fast-track Small Business Innovation and Research grant of nearly \$2 million for a potentially transformative new treatment for arthritis.

The initial Phase I National Institute on Drug Abuse award of \$250,000 supported a successful proof of concept study. The Phase I grant was supported with an additional \$100,000 in matching funds from the Nebraska Department of Economic Development. The \$1.68 million Phase II funding was approved on Jan. 5, 2021. It will support a series of pre-clinical studies that are designed to open the door to filing an investigational new drug application with the FDA.

"This will prepare us for talking to the FDA about the design and implementation of a clinical trial to test the safety and effectiveness of the new drug," Dr. Wang said, adding later: "We're really lucky because the rheumatology and orthopedic programs at UNMC are world class, and have established the Nebraska Arthritis Outcomes Research Center, which has the personnel and expertise to conduct the clinical trials. The campus will be an ideal place to initiate the clinical studies."

Dr. Wang founded Ensign Pharmaceutical on a novel formulation called ProGel, which is an injectable liquid. After ProGel is injected, it transforms into a gel-like substance as it reaches body temperature. The gel is then more likely to linger in the affected area, concentrating the pharmaceutical payload exactly where it needs to be.

Any number of pharmaceuticals can be combined with ProGel, making it a "platform technology." ProGel can be used for localized and sustained delivery of a variety of therapeutic agents to treat a broad spectrum of clinical conditions.

Ensign's first product will incorporate a potent steroid, dexamethasone, into the ProGel formulation. The Phase II study will identify the optimal formulation, and evaluate its long-term efficacy in the treatment of arthritic joint pain.

Dexamethasone is a synthetic version of an anti-inflammatory steroid normally produced by the human adrenal gland. It is a common treatment for lupus, asthma and many other inflammatory diseases, and has gained recent

notoriety for its potential in fighting the COVID-19 pandemic. When injected into a joint, dexamethasone provides temporary relief of debilitating pain and swelling caused by osteoarthritis, a chronic condition that slowly erodes the protective cartilage at the end of bones.

"It's important to note that there is no known cure for osteoarthritis," said Ensign's Chief Medical Officer, Steven Goldring, MD, former Chief of Rheumatology at Beth Israel Deaconess Medical Center in Boston and Professor of Medicine at Harvard Medical School. "Unfortunately, the best we can do today is to manage the pain and inflammation."

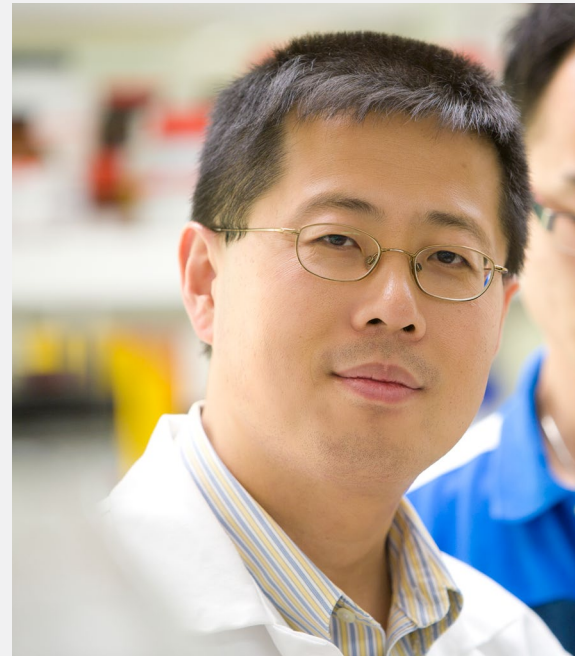
While effective for pain relief, the benefit of dexamethasone is unfortunately short-lived, usually lasting only a few days. However, when formulated with Dr. Wang's ProGel, dexamethasone has the potential to remain active much longer, potentially providing relief for months.

"In mouse models of osteoarthritis, ProGel has shown effective pain relief for at least four months," Dr. Wang said, "but a mouse is very, very different than a human being... These new experiments will help us to better predict how it may work in humans, and to optimize the drug design to provide similar sustained pain relief in humans."

The hydrogel allows a slow release of the payload—dexamethasone, in this case—while being retained at the injection site. In addition to providing a more sustained and stable local release of medication, the hydrogel also has the benefit of limiting potential harmful side effects, including weight gain, increased blood sugar, insomnia and osteoporosis.

Ensign Pharmaceutical also won the 2020 Business Innovation Live Pitch competition in Phoenix during the Orthopaedic Research Society's annual meeting.

"Something like that is great because it shows us that we're not the only ones who are excited about this technology and this company," said Ensign's CEO Brian Beck.



Dr. Wang

2021: YEAR OF THE STARTUP

Parenting app partners with MMI, relocates to Omaha

The headquarters for a popular parenting web application relocated from Pennsylvania to Omaha, closer to research partners at the University of Nebraska Medical Center's Munroe-Meyer Institute.

The web app—Keys to Interactive Parenting Scale, or KIPS for short—is dedicated to supporting and providing resources to early childhood development professionals. Family support organizations like social services or school districts rely on KIPS to help train staff as they assist families with young children that need or want extra help. KIPS can also measure a parenting program's impacts and outcomes.

Appsby, a custom software development and design agency in Omaha, acquired the KIPS program as a part of Appsby's new venture capital division, Appsby Ventures.

"I saw an amazing opportunity with KIPS," said Appsby founder and CEO Taylor Korensky. "It's a chance to learn and develop our infant fund, and a way to improve and rework a really important tool with our technology."

At more than 10-years-old, the software behind KIPS, including the user interface, is dated and needs upgrades. In the process, updating the software creates an opportunity to allow for more accessibility and greater impact for a more diverse range of users, said Appsby Chief Operations Officer Jade Jensen.

"We have been exploring opportunities related to software in the early childhood development sector, and helping kids is one of our passions," Jensen said.

The KIPS program first helps train workers that support families. KIPS can then help those workers assess 10- to 20-minute play sessions between parents and their children. The results are then used to chart progress and guide caregivers to more beneficial outcomes.

"Programs across the world use KIPS," said Rosie Zweiback, Associate Director of MMI's Education and Child Development department. "It really helps people who work with families. KIPS identifies parenting strengths, and what they need to work on to enrich those essential parent-child interactions. It can also be really valuable for parents to watch their videos to see all the great things they are doing to nurture their child."

Zweiback and Barbara Jackson, PhD, the Director of Education and Child Development at MMI, have been "power users" of the KIPS web app from the beginning, and were a major factor in relocating the KIPS

headquarters to Omaha. The original developers planned to retire and initially asked Zweiback and Dr. Jackson to take over the application.

But maintaining and upgrading a web application was beyond the researchers' scope of expertise.

"This is wonderful tool, but if we couldn't find a home for it, it would've gone away," Dr. Jackson said.

Michael Dixon, PhD, president and CEO at UNeMed, UNMC's technology transfer and commercialization office, reached out to Appsby.

"Appsby looked into it and they loved it," Dixon said. "They're a great partner for us. They can run the technical side, and that leaves the academic side to focus on more research that gives us even greater insights into parenting and early child development. I couldn't be happier that we were able to make this connection and allow this business to be moved to Nebraska. It's a win for our economy, our researchers and parents around the world since it is a product that is used globally."

Zweiback and Dr. Jackson have been using KIPS for the last 10 years, and will work with Appsby to update more than 10 hours of training modules and other features. The pair will also use a portion of grant funding to further research on how to improve KIPS for a more diverse range of families.

Appsby recently secured a \$100,000 matching grant from Nebraska's Department of Economic Development. The grant is a part of the Academic R&D program within the state's Business Innovation Act. This program encourages Nebraska companies to develop research programs with the University to advance the commercialization of products.

"We're going to look at how to improve the training videos and look at the cultural sensitivity of the videos," Zweiback said. "Having a video of parent-child interactions and a reliable validated tool to score it gives parent coaches another way to support their families. The videos can help confirm what they think is going on or give them insights into behaviors they may have missed."

Once the program has been fully updated, there's enough room for growth to create a handful of new jobs in the area, Appsby's CEO Taylor Korensky said.

"We're looking at adding 10 jobs in the next five years, if we do it right," he said.

University partners with VC group to bring technologies to market

Proven Ventures placed a big bet on the ingenuity of the University of Nebraska.

The University of Nebraska is full of experts: Researchers, clinicians, technicians and students who have made it their purpose to understand everything they can about a single, crucial factor in human health.

For many, securing a patent or publishing their research in journals like *Nature* or *Science* is the penultimate outcome of all those sleepless nights.

But that's not the main goal. The main goal is to positively impact human lives. And, to achieve that goal, an invention must ultimately be commercialized.

UNeMed and UNeTech Institute, the startup incubator for UNO and UNMC, have worked diligently to identify, protect and commercialize University inventions. An important part of this process is recruiting experienced, qualified entrepreneurs willing to partner with University inventors to form small business startups around University technology.

But where do you find experienced, qualified entrepreneurs?

Enter Proven Ventures.

Proven Ventures, a Burlington Capital Fund located in downtown Omaha, has partnered with UNeMed and UNeTech to bring experienced entrepreneurs to the table

to run University startups. The entrepreneurs will come alongside University experts to bring state-of-the-art technologies to market where they can solve real-world problems to benefit real people. Better yet, startups will be homegrown and nurtured in Nebraska, providing desirable jobs and training for our local, talented workforce.

The Omaha region is full of experts: Executives, MBAs, CEOs and venture capitalists who have cut their teeth forming and running businesses of all shapes and sizes.

For many, earning a Business Excellence Award or landing in the 40-under-40 group is the penultimate outcome of all those sleepless nights.

But that's not the main goal. The main goal is to positively impact human lives. And to achieve that goal, a business must do something truly innovative.

Sound familiar?

It should.

What too many fail to realize (and why too many promising startups unexpectedly fail) is that entrepreneurs and academic innovators need each other. They're made of the same stuff. They want the same things. What they really need is a way to help each other succeed.

And that's what Proven Ventures and UNeMed are now better positioned to do.

Message *continued from page 1*

improving lives and healthcare on a massive scale in just a few years.

Vireo Systems spun out of a nutritional supplement developed at UNMC. They've built a manufacturing facility just down the road from us, and plan to continue growing with a \$50 million mixed-use facility that will expand its operation, bring in more high-paying jobs, and boost the local economy.

Radux Devices has such a strong, disruptive innovation, that they managed to power through the pandemic despite having one hand figuratively tied behind their back at a crucial time in their journey. Despite it all, their devices are on the market, and they continue to gain traction in the market.

Ensign Pharmaceutical is among our more recent startups, but they too are bringing in incredibly

encouraging grant awards while earning high marks at various startup showcases.

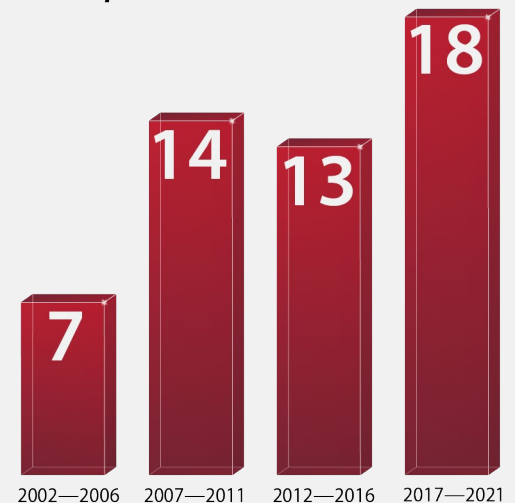
Our elite researchers and innovators attracted another startup company to relocate nearby for better access to UNMC's expertise and advice.

And others are inviting investments from around the world, including RespireAI, an Israeli startup built around an innovation developed at the world-class biomechanics department at UNO.

In fact, another biomechanics-based startup, Impower Health, is beginning to turn heads with a potential industry-disrupting treadmill that speeds up and slows down to match the user's pace. No other inputs are necessary.

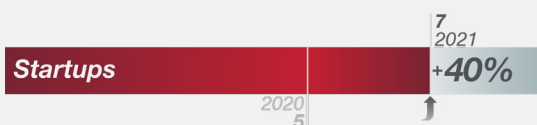
The road to success for a startup is a long one, to be sure. Especially in

Startups



the biomedical industry where overnight successes often take 10 years or more.

We're excited that this amalgamation of entrepreneurship and biomedical innovation will continue to pay dividends in the future.



2020 INNOVATION AWARDS

Pandemic innovations highlight 2020 Innovation Awards

UNeMed's 2020 Research Innovation Awards Ceremony was a virtual event that featured a Most Promising New Invention, the Startup of the Year and the Innovators of the Year.

"The pandemic did not slow down innovation here, in fact it added fuel to the fire," UNeMed President and CEO Michael Dixon, PhD, said during the 40-minute presentation. "We saw more than twice as many new inventions (73) in the last two quarters of 2020, making it the most productive six-month span in our history."

For just the second time in the event's 14-year history, UNeMed recognized the efforts of a group of inventors as the 2020 Innovators of the Year. More specifically, the award went to all UNMC and UNO faculty, students and staff who contributed a new invention related to fighting the COVID-19 pandemic during the fiscal year ending in 2020.

In just a few months, 44 University inventors combined their expertise and experience to create 28 new inventions related to the pandemic.

Most of those innovations focused on helping protect healthcare providers, and some were fast-tracked to market and used throughout the world. For example, UNMC inventors created an intubation shield that several American hospitals and care facilities purchased in bulk quantities. Another device, an infectious disease filter adapter for air masks, sold to the

U.S. Air Force, also in bulk quantities.

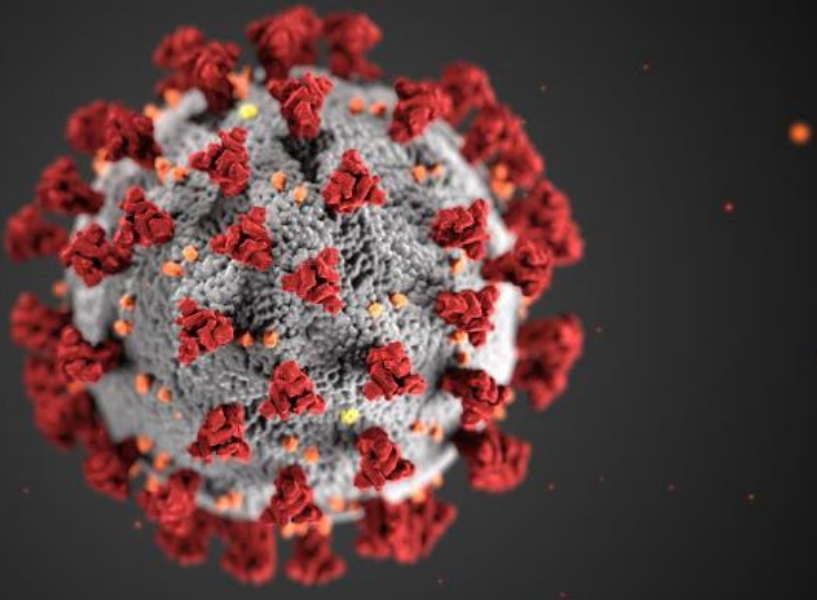
Other innovations included mobile applications to help track or screen the pandemic; new mouse models and assays to help improve study of the novel coronavirus responsible for the pandemic; solutions to personal protective equipment shortages; and solutions to limit the spread of infectious disease.

The Most Promising New Invention was the "Anterior Cervical Space Spreader," a device born from the collaboration of surgeons Joseph McMordie, MD, and Daniel Surdell, MD. Their device is a new approach to c-spine retractors that could help future surgeons increase their access during complicated and delicate neurosurgeries.

Sponsored by UNeTech, the Startup of the Year award went to BreezMed, founded by UNMC psychiatrist Stephen Salzbrenner. BreezMed was founded on a software solution Dr. Salzbrenner created to help doctors and pharmacists better manage patient prescriptions.

The Innovation Awards confers recognition for all UNMC and UNO inventors that, during the previous fiscal year, submitted a new invention, were issued a United States patent or had a technology licensed.

A video of the 2020 Innovation Awards ceremony is also available through UNeMed's YouTube channel at <https://bit.ly/UNeMedAwards20>.



INNOVATION AWARDS

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Award History

| Most Promising New Invention | | |
|------------------------------|--|--|
| 2020 | Joseph McMorie, MD Daniel Surdell, MD | Anterior Cervical Space Spreader |
| 2019 | Corey Hopkins, MD | PDE4B Selective Inhibitors |
| 2018 | Catherine Gebhart, PhD Varun Kesharwani, PhD | Multiplex Assay for Rapid Detection of HSV1, HSV2, EBV and CMV by qPCR |
| 2017 | Jingwei Xie, PhD Shixuan Chen, PhD Mark Carlson, MD | Nanofiber Sponges for Hemostasis |
| 2016 | Joyce Solheim, PhD Tatiana Bronich, PhD | Compositions for Modulated Release of Proteins and Methods of Use Thereof |
| 2015 | Michael Wadman, MD, FASEP Thang Nguyen, MSN, APRN, FNP-C | Emergency Medicine Care Portfolio: Wound Irrigation System & Oral Airway Management |
| 2014 | Jason MacTaggart, MD | Orthogonal AquaBlade |
| 2013 | Keshore Bidasee, PhD | Targeted Glyoxalase-1 Gene Transfer to Prevent Cardiovascular and End-Organ Complications in Diabetes |
| 2012 | Gregory Oakley, PhD | Small Molecule in Vivo Inhibitors of the N-Terminal Protein Interacting Domain of RPA1 |
| 2011 | Babu Padanilam, PhD | Novel Target for the Treatment of Renal Fibrosis |
| 2010 | Stephen Bonasera, MD, PhD | Noninvasive Monitoring of Functional Behaviors in Ambulatory Human Populations |
| 2009 | Paul Dunman, PhD | Novel Antibiotic Compounds |
| *2008 | Guangshun (Gus) Wang, PhD | Anti-HIV Peptides and Methods of Use Thereof |
| *2008 | Janina Baranowska-Kortyle- wicz, PhD | Sex Hormone Binding Globulin: New Target for Cancer Therapy |

**Note: Most promising new invention award was shared in 2008*

Special Awards

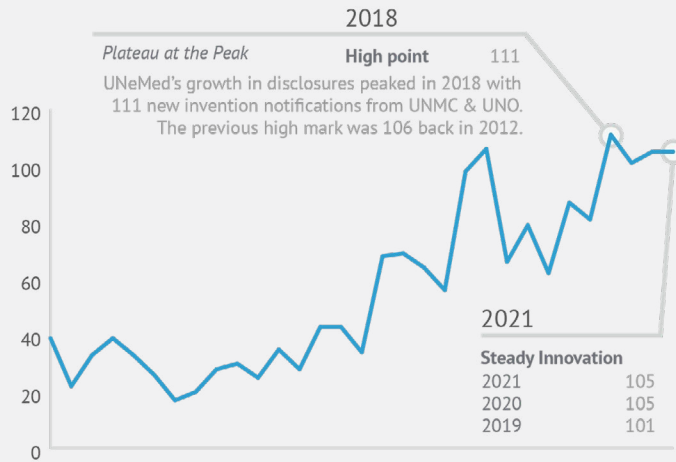
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|------|-----------------------------------|-------------------------------|
| 2020 | COVID-19 Inventors | Innovators of the Year |
| 2020 | BreezMed | Startup of the Year (UNeTech) |
| 2019 | Benson Edagwa, PhD | Emerging Inventor |
| 2019 | FutureAssure | Startup of the Year (UNeTech) |
| 2018 | UNO Department of Biomechanics | Innovator of the Year |
| 2018 | Centese, Inc. | Startup of the Year (UNeTech) |
| 2017 | Donny Suh, MD | Emerging Inventor |
| 2016 | Irving Zucker, PhD | Innovator of the Year |
| 2015 | Tammy Kielian, PhD | Innovator of the Year |
| 2014 | Marius Florescu, MD | Emerging Inventor |
| 2013 | Howard Gendelman, MD | Innovator of the Year |
| 2012 | Tammy Kielian, PhD | Emerging Inventor |
| 2011 | Jonathan Vennerstrom, PhD | Lifetime Achievement |
| 2010 | Amarnath Natarajan, PhD | Emerging Inventor |
| 2009 | Rodney Markin, MD, PhD | Lifetime Achievement |
| 2008 | Dong Wang, PhD | Emerging Inventor |
| 2007 | Robert LeVein, MD | Lifetime Achievement |



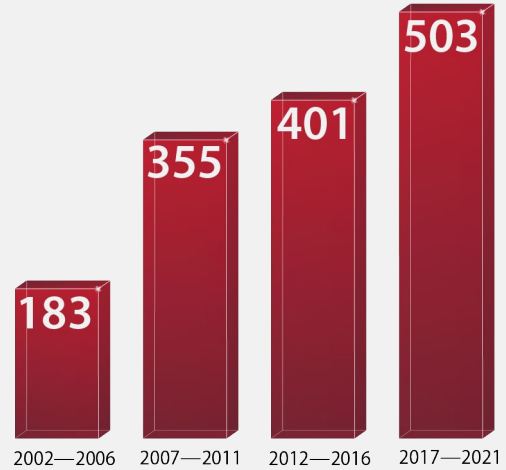
Core Metrics

105 New inventions
170 Unique inventors
90 New inventors

New Invention Notifications



New Inventions



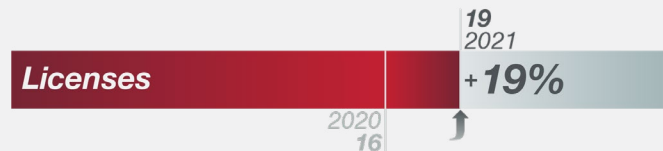
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Record number of opportunities, which reflect the amount of interactions that UNeMed generated with companies to review UNMC & UNO technologies.

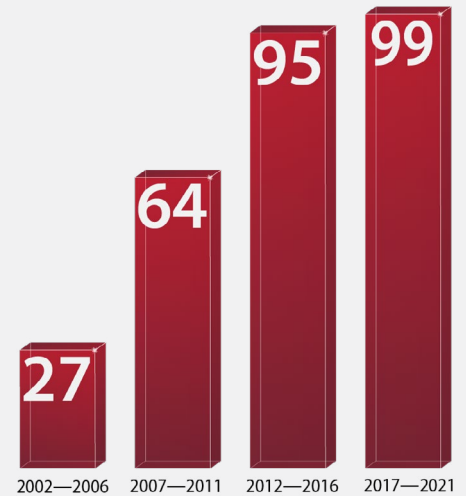
Core Metrics

19 Licenses
117 Active licenses
40 Products on market
7 New startups

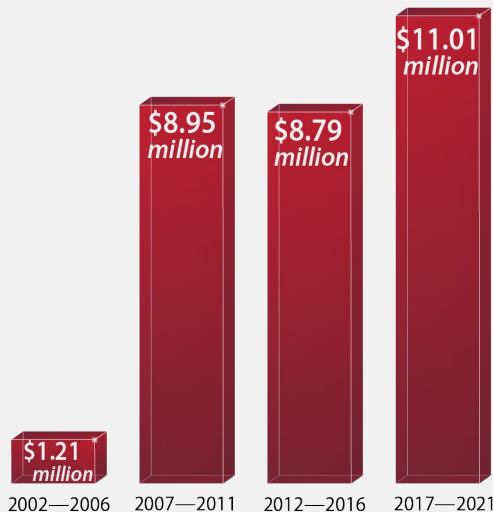
Licenses



Licensing Agreements



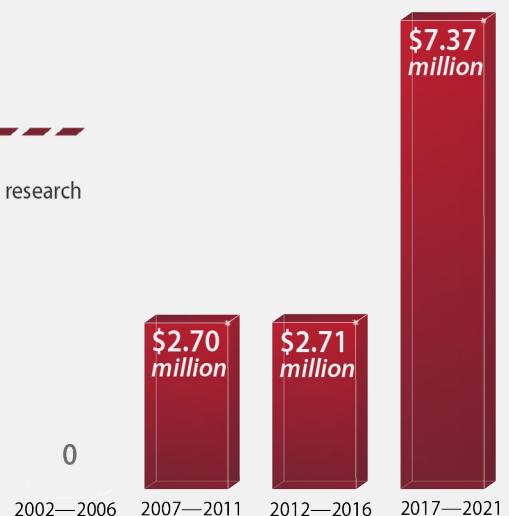
Total Revenue



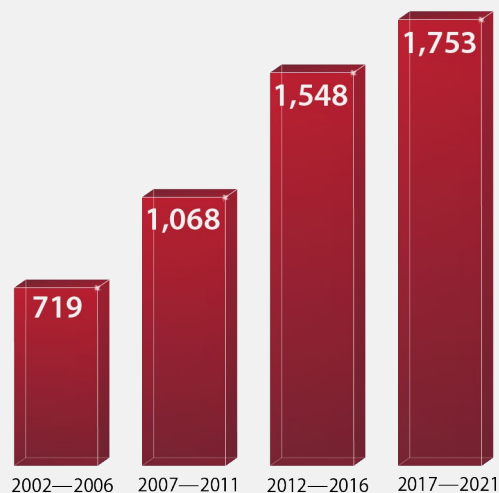
Core Metrics

\$2.15 million Revenue
\$1.46 million Sponsored research

Sponsored Research Agreements



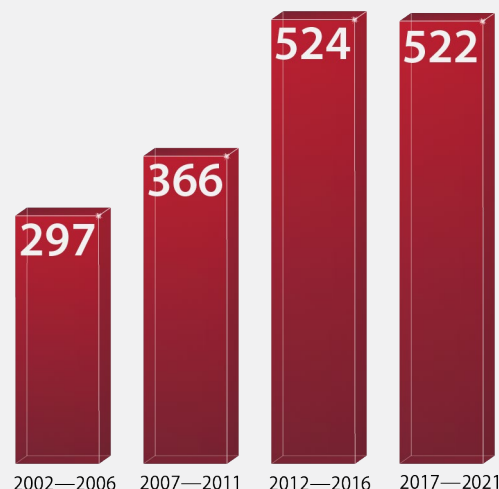
Material Transfer Agreements



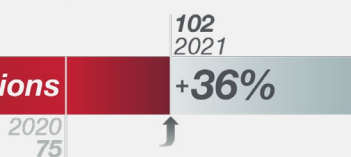
Core Metrics

310 MTAs
96 CDAs
161 Patent applications

Confidential Disclosure Agreements



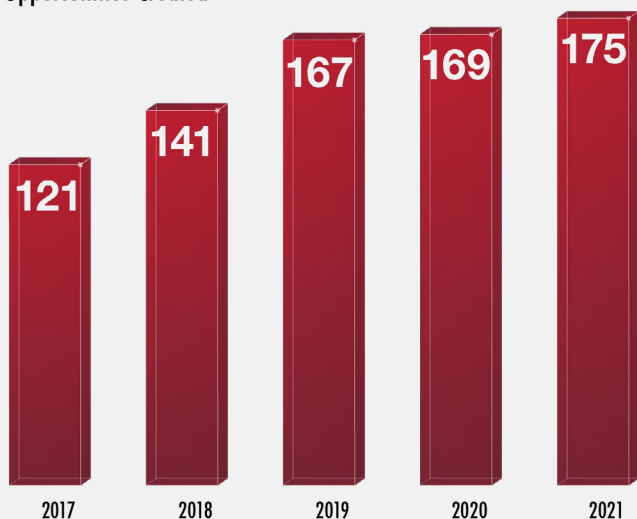
U.S. Patent Applications



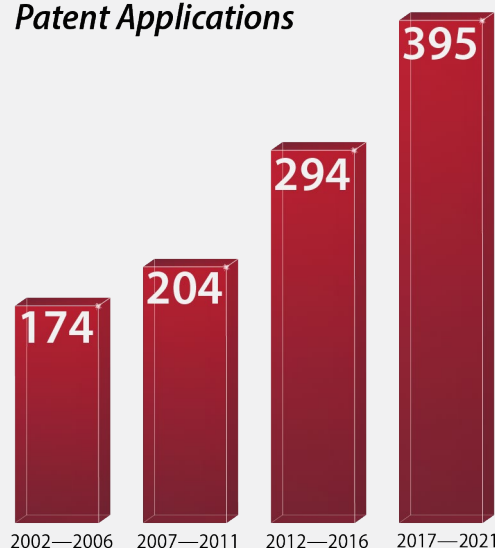
102

A new record for U.S. patent applications punctuates recent growth. In 2012-2016, UNeMed averaged 58.5 applications, but that average exploded to 78.8 in 2017-2021.

Opportunities Created



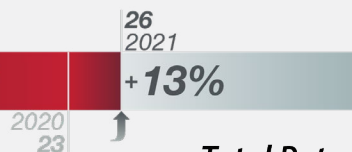
Patent Applications



26

UNeMed snapped its longest-held record in company history: 24 U.S. patents in 1997. This marks just the third time UNeMed secured more than 20 patents in a year.

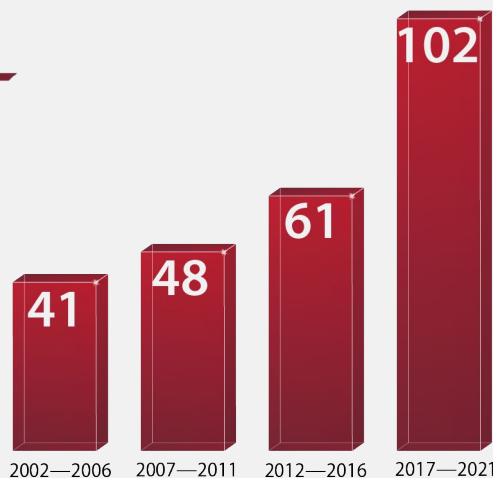
U.S. Patents Issued



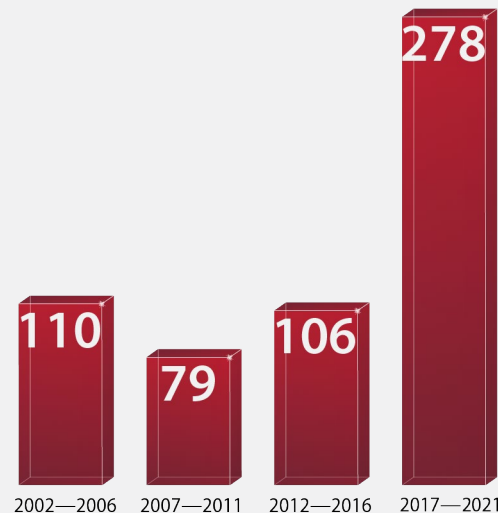
U.S. Patents

Core Metrics

59 Total patents issued
26 U.S. patents issued
31 Foreign patents issued
2 Design patents issued



Total Patents



2021 U.S. PATENTS

List of all U.S. patents issued to UNMC & UNO personnel during the fiscal year ending in 2021.

Information includes patent numbers, patent titles, the date the patent was issued and the names of all co-inventors listed on the patent.

Robotic Device with Compact Joint Design and an Additional Degree of Freedom and Related Systems and Methods

U.S. Patent No. 10,702,347 — issued July 7, 2020

■ Lou Cubrich
■ Shane Farritor
■ Tom Frederick

Anti-Microbial Peptides and Methods of Use Thereof

U.S. Patent No. 10,723,764 — issued July 28, 2020

■ Guangshun Wang

Distal Radius Plate

U.S. Patent No. D892,330 — issued Aug. 4, 2020

■ Daniel Firestone

Methods for Administration and Methods for Treating Cardiovascular Diseases with Resiniferatoxin

U.S. Patent No. 10,729,643 — issued Aug. 4, 2020

■ Irving Zucker
■ Hanjun Wang

Methods Systems and Devices

Relating to Force Control Surgical Systems

U.S. Patent No. 10,743,949 — issued Aug. 18, 2020

■ Joe Bartels
■ Jacob Greenburg
■ Kearney Lackas
■ Shane Farritor
■ Tom Frederick

Automated Retrievable Hemorrhage Control System

U.S. Patent No. 10,758,386 — issued Sept. 1, 2020

■ Jason MacTaggart
■ Alexey Kamenskii

Stent to Assist in Arteriovenous Fistula Formation

U.S. Patent No. 10,772,718 — issued Sept. 15, 2020

■ Marius Florescu

Fluid Jet Arterial Surgical Device

U.S. Patent No. 10,779,851 — issued Sept. 22, 2020

■ Nicholas Phillips
■ Alexey Kamenskii
■ Jason MacTaggart
■ Amy Mantz

Ring and Tubular Structures and Methods of Synthesis and Use Thereof

U.S. Patent No. 10,799,620 — issued Oct. 13, 2020

■ Jingwei Xie
■ Shixuan Chen
■ Bernard Baxter

Compositions and Methods for the Treatment of Biofilm Infections

U.S. Patent No. 10,821,178 — issued Nov. 3, 2020

■ Tammy Kielian

Lock-Block Shield Device

U.S. Patent No. 10,856,819 — issued Dec. 8, 2020

■ Gregory Gordon

Gene Therapy for Juvenile Batten Disease

U.S. Patent No. 10,876,134 — issued Dec. 29, 2020

■ Tammy Kielian
■ Kevin Foust

MIBG Analogs and Uses Thereof

U.S. Patent No. 10,874,752 — issued Dec. 29, 2020

■ Janina Baranowska-Kortylewicz
■ Zbigniew Kortylewicz

Creatine Oral Supplementation Using Creatine Hydrochloride Salt

U.S. Patent No. 10,881,630 — issued Jan. 5, 2021

■ Jonathan Vennerstrom
■ Donald Miller
■ Mark Faulkner

Devices and Methods for Detecting and Measuring Sympathetic Vasomotion

U.S. Patent No. 10,881,303 — issued Jan. 5, 2021

■ Irving Zucker
■ Alicia Schiller
■ Peter Pellegrino

Polyethylene Glycol-Conjugated Glucocorticoid Prodrugs and Compositions and Methods Thereof

U.S. Patent No. 10,933,071 — issued March 2, 2021

■ Fang Yuan
■ Zhenshan Jia
■ Xiaobei Wang
■ Dong Wang

Controlled Release Peptide Compositions and Uses Thereof

U.S. Patent No. 10,945,962 — issued March 16, 2021

■ Joseph Vetro
■ Sam Sanderson

Pyrrolomycins and Methods of Using the Same

U.S. Patent No. 10,954,192 — issued March 23, 2021

■ Kenneth Bayles
■ Rongshi Li
■ Yan Liu

Multifunctional Operational Component for Robotic Devices

U.S. Patent No. 10,959,790 — issued March 30, 2021

■ Nathan Wood
■ Jason Dumpert
■ Dmitry Oleynikov
■ Mark Rentschler
■ Shane Farritor
■ Amy Lehman

Portable Laparoscope System

U.S. Patent No. 11,006,818 — issued May 18, 2021

■ Dennis Alexander
■ Chandrakanth Are
■ Madhuri Are

Single-Arm Robotic Device with Compact Joint Design and Related Systems and Methods

U.S. Patent No. 11,013,564 — issued May 25, 2021

■ Shane Farritor
■ Joseph Palmowski

Survival Predictor For Diffuse Large B Cell Lymphoma

U.S. Patent No. 11,028,444 — issued June 8, 2021

■ Wing (John) Chan
■ Dennis Weisenburger

Robotic Surgical Devices Systems and Related Methods

U.S. Patent No. 11,032,125 — issued June 8, 2021

■ Kyle Strabala
■ Amy Lehman
■ Dmitry Oleynikov
■ Ryan McCormick
■ Tyler Wortman
■ Shane Farritor
■ Eric Markvicka

Computational Simulation Platform for Planning of Interventional Procedures

U.S. Patent No. 11,026,749 — issued June 8, 2021

■ Ioannis Chatzizisis

Nanofiber Structures and Methods of Synthesis and Use Thereof

U.S. Patent No. 11,033,659 — issued June 15, 2021

■ Jingwei Xie
■ Jiang Jiang

Triazole Bisphosphonate Geranylgeranyl Diphosphate Synthase Inhibitors

U.S. Patent No. 11,033,560 — issued June 15, 2021

■ Sarah Holstein
■ David Wiemer

Healthcare Provider Interface for Treatment Option and Authorization

U.S. Patent No. 11,043,293 — issued June 22, 2021

■ Stephen Salzbrenner



Radux *continued from page 3*

Don't do that, do this

In 2012, Dr. Gordon solved the problems with two seemingly simple ideas.

One is called the "Steradian Shield," which is about the size of a steno notebook. It's a sterile, moveable device that can be placed virtually anywhere, in any position, to block the radiation gaps from entering the physician's workspace.

Another device, called "StandTall," helps physicians better manage and direct the catheters used during fluoroscopic procedures. StandTall was designed to help bring the workflow closer to the surgeons while at the same time moving them further away from the radiation.

Such simple improvements may seem inconsequential, but the change is dramatic in a fluoroscopic suite. What they've essentially done is eliminate all the troubles associated with left-arm access, allowing physicians to comfortably perform left radial procedures from the right table setup, giving that gold standard of care a chance for wider use in the United States. The benefits just cascade from there.

No longer in pain and in fear of radiation exposure, physicians can perform procedures faster, more efficiently and more of them. Their use of the preferred access sites leads to better patient outcomes, less complications, and lower costs. A radial access procedure, on average, costs \$1,000 less than a femoral access procedure.

Meanwhile the hospital and catheter labs increase the number of procedures that can be performed in a day, with fewer complications and far fewer expenses.

If there are any losers, it might be the chiropractors and orthopedic specialists that interventional radiologists seek out for relief.

Word from the field

In an interview published in the March 2020 issue of Cath Lab Digest, one physician found that using the StandTall Device helped him

improve his radial access rate, going from 80 percent to 95 percent.

"The StandTall has allowed me to adopt a left radial first approach for bypass cases, because I can use a left radial access without having to lean over the table," said Ryan D. Maddar, MD, Section Chief of Interventional Cardiology and Director of the Cath Lab at the Frederik Meijer Heart & Vascular Institute at Spectrum Health in Grand Rapids, Michigan.

He added: "...we have seen an increase in radial access rates as a whole for our entire lab and along with that, we have seen a reduction in our access site bleeding complications. I do think the StandTall has made it more comfortable for operators to use left radial access in bypass cases."

For the dry prose of a practicing clinician, that's a ringing endorsement. It's made all the more remarkable with the knowledge of how fraught and treacherous the road for a startup can be.

At Radux, the first few years was a constant struggle to secure funding just to build a few prototypes.

As it turned out that was the easy part.

The long road

The University of Nebraska provided some help with a proof of concept grant, and the state's burgeoning venture capital community stepped in as well.

But one thing many people don't know about innovation is that the first prototype is just that: The first.

What follows are countless iterations, and follow-on experiments to test incremental changes and improvements. All the while, the fund-raising beast is voracious and must be fed, constantly.

By 2016 Dr. Gordon stepped back from full-time practice in order to help his startup grow.

The extra time appeared to pay off. Radux secured FDA registration, and finally rolled out its official launch with a national distributor in September 2019. There was actually

revenue, which is no small feat for a fledgling startup.

Even better, more and more hospitals were buying into the devices Radux created: It was an easy sell once doctors and administrators were able to use them.

What pandemic?

Today, in spite of a pandemic that shut down all non-emergency procedures, Radux continued its momentum. So far, Radux boasts nine full-time employees, and their devices are in more than 70 hospitals nationwide with a high reorder rate, supporting their sales model and product acceptance.

And when face-to-face meetings become a thing again, those numbers are expected to keep growing.

It would be shocking if it didn't.

The undeniable thing about these devices is that when they get into the hands of health care professionals, the response has been overwhelmingly positive.

In essence, they tell Radux it hurts to do what they do.

Radux responds with far more than an old punchline.



Dr. Gordon

2021: FEATURED TECHNOLOGIES

REMOTE-ICU

Keep patients' loved ones involved

The most effective in-patient care includes family participation, but that is nearly impossible when patient loved-ones can't be there in person.

Breanna Hetland, PhD, RN, has developed a software application to ensure patients can stay connected with their families.

Remote-ICU invites patients and families to co-create a virtual patient profile, which is then visible to healthcare providers as well. In addition, Remote-ICU includes virtual hospital tours and patient-family direct communication.

The ICU tour component of the software application is currently in use at the

University of Nebraska Medical Center, while the virtual patient profile is undergoing research trials.

- Software application remotely connects patients with loved ones
- Creates virtual patient profile
- Invites patient and family input
- Incorporates "patient/family view" and a "provider view"
- Includes virtual hospital tours and patient/family direct communication

AEROSOL CAPTURE MASK

Device protects healthcare workers from viruses

A new protective device can help protect healthcare workers everywhere, preventing infected patients from spraying or exhaling viral agents and potentially infecting others in the room.

Developed by the chair of UNMC's Department of Anesthesiology, Steven Lisco, MD, the Infectious Aerosol Capture Mask is a face tent that covers the patient's mouth and nose, and is then coupled with a viral filter and a special adapter that connects the unit to standard vacuum supplies in most clinical settings.

- Limits caregiver exposure to aerosolized viral agents
- Covers patient's mouth and nose
- Assembled from commonly available products in clinical settings
- Universal adapter connects to standard vacuum line found in most clinical settings

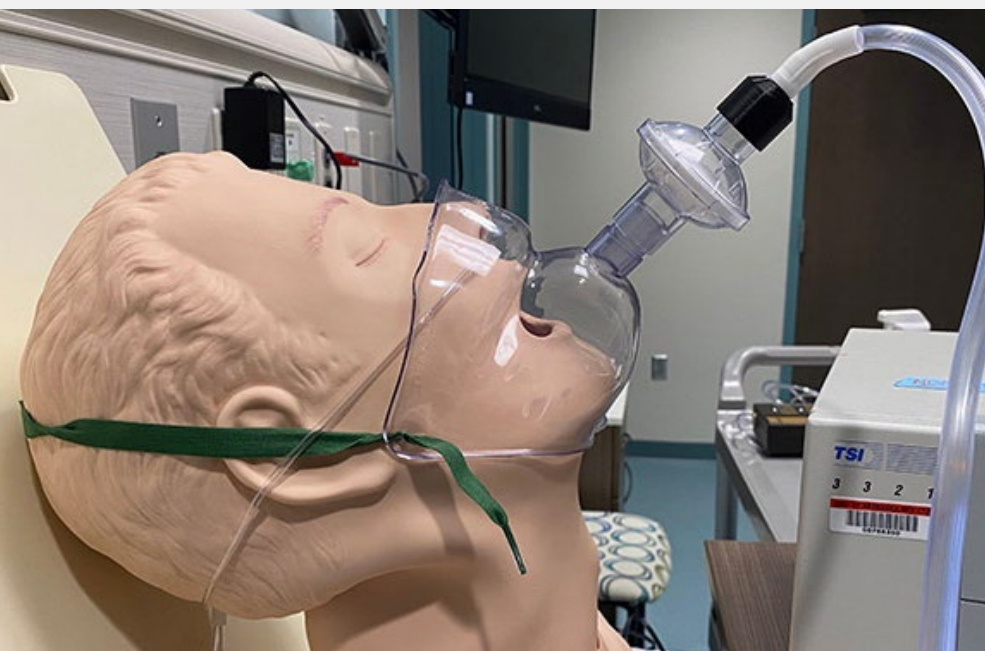
The Nebraska Medicine Innovation Committee has approved the device for use in its facilities, and has already deployed them in operating rooms and

elsewhere in the hospital.

Hospitals risk wider contamination from COVID-19 patients when they cough or even just breathe. They produce microscopic particles that float through the air of their rooms, and potentially beyond. Even patients that have no symptoms may still unwittingly spread the virus in the same way, particularly when wearing supplemental oxygen or undergoing the procedures that insert or remove breathing tubes.

Dr. Lisco said in a recent announcement the device performed well in early tests, "catching more than 90 percent of airborne particles expelled in the mask, ultimately preventing the aerosol from entering the patient environment." He added: "Even when the vacuum wasn't turned on, the mask was still 85 percent effective as a barrier."

At this initial stage, the special adapter for the Infectious Aerosol Capture Mask is available for purchase through Omaha Custom Manufacturing at info@omahacustommfg.com or 800-228-5021. All other components are commonly accessible in most clinical settings and readily found through various medical equipment suppliers.



DISTAL RADIUS FRACTURE

Universal plating system saves time, improves outcomes

Wrist fractures don't come in one shape and size, but a new fixation device just might. A leading orthopedic surgeon at the University of Nebraska Medical Center, Daniel Firestone, MD, invented a universal wrist fracture fixation plate. By studying fragment-specific plating

- Universal plate for distal radius fractures
- Benefit of optimal fragment fixation systems
- Benefit of surgeon comfort with the procedure
- Replaces, combines several plating systems into one

systems, Dr. Firestone designed a novel plate that blends the essential components of each. The result is an elegant system with enough flexibility to secure any of the most common wrist fracture patterns.

The Firestone Plating System is a next-generation technology that provides all of the benefits of fragment specific plating without the drawbacks associated with surgically placing multiple devices. It singlehandedly addresses a number of fractures in both dorsal and volar fragments. It's easy to use and easier to install, potentially increasing operating room and surgical efficiency.



AUTOMATED ANTIBIOGRAM

Automated, real-time antimicrobial stewardship solution

A UNMC Public Health Informatics team led by W. Scott Campbell, MBA, PhD, has developed an automated, real-time antibiogram.

All hospitals and clinics are federally required to report antibiotic usage as part of their antimicrobial stewardship. This software application can easily connect with any hospital system to generate real-time, automated reports.

On top of fulfilling a mandated requirement, these reports can also help clinicians make more intelligent antibiotic selections.

The software application is currently in use at the University of Nebraska Medical Center.

- Automated software application
- Generates hospital-specific antibiograms
- Uses patient data and controlled medical terminologies
- Could inform antibiotic usage



2021: FEATURED TECHNOLOGIES

METFORMIN NANOFORMULATION

New nanoformulation treats cancer, immunological diseases



New nanoformulation treats cancer, immunological diseases

Researchers at the University of Nebraska Medical Center have developed a novel nanoformulation of metformin for the treatment of cancer.

Physicians commonly prescribe metformin to reduce the liver's production of glucose as a way to manage type II diabetes and help regulate a patient's blood sugar. Because cancers typically demand very high levels of sugar, metformin has been a drug of interest for cancer researchers.

A team of researchers at UNMC, under the direction of Chi Zhang, MD, developed a novel nanoformulation of metformin that enhances delivery to the tumor and increases cancer cell uptake of the drug.

Research shows that the metformin

- Increases concentration of drug in target tissues
- Sensitizes cancer tissue to radiation
- May enhance current treatment strategies

nanoformulation enhances survival in a mouse model of glioblastoma. When given as a combination with radiation therapy, survival was further enhanced with around 60 percent of the mice surviving beyond 40 days. Mice treated with radiation and regular metformin only, however, survived beyond 40 days in just 20 percent of cases.

Due to its ability to modulate the activity of macrophages, the nanoformulated metformin can also treat inflammatory diseases.

HIV RESERVOIR DETECTION ASSAY

New test finds hidden viral reservoirs

A new HIV test can pinpoint the size and location of hidden viral reservoirs, a critical breakthrough in the hunt for a cure.

The UNMC innovation could help answer an essential question that has long eluded researchers everywhere: How do viral reservoirs persist in the body?

Several studies have attempted to identify these reservoirs, but the topic remains an ongoing debate.

Anti-retroviral therapy, or ART, allows HIV-infected individuals to lead long, healthy lives, but the virus is always there, hiding. ART keeps the virus in check, but patients must adhere to a strict treatment regime for the rest of their lives. Stopping ART therapy leads to HIV reemergence. Patients on ART need their viral load, or amount of virus in the body, consistently measured to monitor treatment efficacy. Unfortunately, current tests measure viral loads, but with the following limitations:

- Low dynamic range
- Use of bulk HIV infected cells
- Under- or overestimate the size of the reservoir

HIV researchers Siddappa Byrareddy, PhD, and Arpan Acharya, PhD, created a more sensitive HIV test. They wanted to quantify active and latent HIV reservoirs at the single-cell level: An essential step towards a cure.

Their new HIV test can detect where the viral reservoirs are and measure

the size of the reservoir down to a single-cell level. The test uses cutting-edge CRISPR-Cas13 technology to differentiate if a few highly active cells or many moderately active cells produce the viral transcripts.

Another essential aspect of this assay is distinguishing between latent and actively replicating viruses. Detecting active viral replication allows clinicians and researchers to identify viral resistance to treatment, prescribe the best treatment regime, and guide new therapy development.

The new test is also a research tool to study the simian immunodeficiency virus, an HIV-like virus that infects monkeys and apes. Simian immunodeficiency virus causes a disease similar to AIDS, and its research often provides insights into its close relative, HIV.

- Distinguish between latent and active virus
- Single-cell analysis
- Highly sensitive & specific



HEIGHT ADJUSTABLE RADIAL PLATFORM

Improve catheter stability, patient comfort during interventional procedures

UNMC physicians have finally solved an ongoing problem facing interventional radiologists everywhere: How to access the patient vascular system through the radial artery in the arm or wrist.

A major challenge to adoption of the radial approach is adjusting to changes in room set-up. This new device tackles the problem.

Interventional radiology procedures involve a physician threading a wire or catheter through the patient's veins or arteries. The minimally invasive procedures have a wide range of uses that include diagnosis, treatment and collecting tissue samples.

It's well-established that radial access leads to far greater chances of success and better patient outcomes. Yet, due to awkward patient positioning, quirks of vascular anatomy and the cumbersome set-up for a radial approach, radial access remains a significant challenge for most interventional radiologists.

Traditionally, interventionists have avoided those challenges by using the femoral artery in the leg. But femoral access carries with it a significantly increased risk of complications.

This new medical device removes

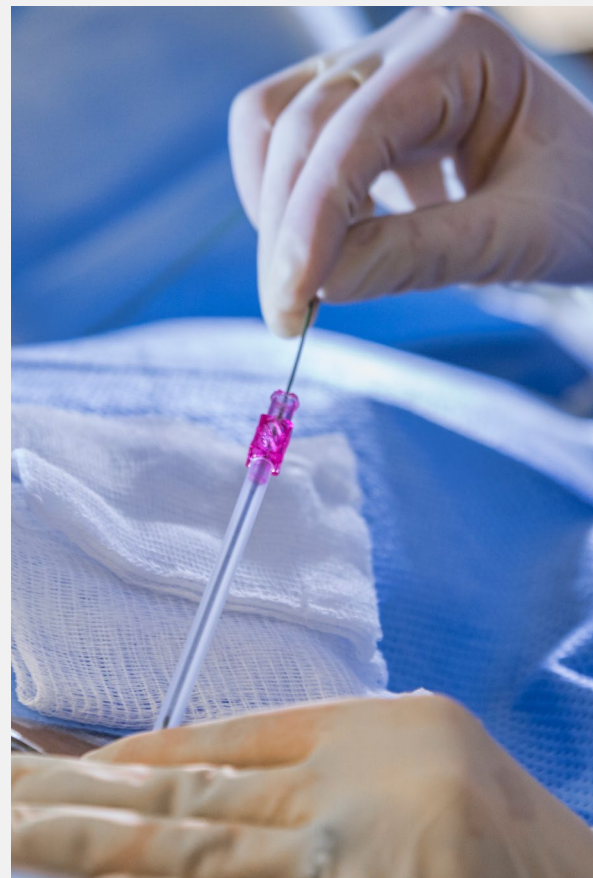
- Comfortably position patient wrists
- Prevents catheter instability, falling
- Adjusts to any-sized patient
- Works for right- and left-arm interventions

nearly all the challenges associated with radial access.

The innovative design comfortably positions a patient's wrist while stabilizing the catheter. The wrist and catheter platform are independently adjustable for optimal tilt, length, and height to accommodate any patient size. The device also works for both left- or right-arm access.

Interventions through the radial artery carry more advantages compared to the traditional femoral artery approach, which include:

- lower risk of bleeding complications
- improved patient recovery time
- no requirements to hold pressure, or use closure devices at the catheter site
- increased patient comfort



GGDPS INHIBITORS

Small molecule inhibitors of GGDPS provide new treatment approach for cancer

Researchers at the University of Nebraska Medical Center and the University of

Iowa have teamed up to develop new drugs to help treat multiple myeloma and other types of cancer.

The new drugs target a protein called geranylgeranyl diphosphate synthase, also known as GGDPS.

GGDPS is involved in the regulation of the Rab family of small but

- Small molecule inhibitors of GGDPS
- Nanomolar potency
- Novel treatment approach for multiple myeloma and other cancers

important proteins that are also often linked to cancer: GTPases. Targeting

GGDPS may provide a way to inhibit Rab family proteins, providing a unique way to treat various forms of cancer.

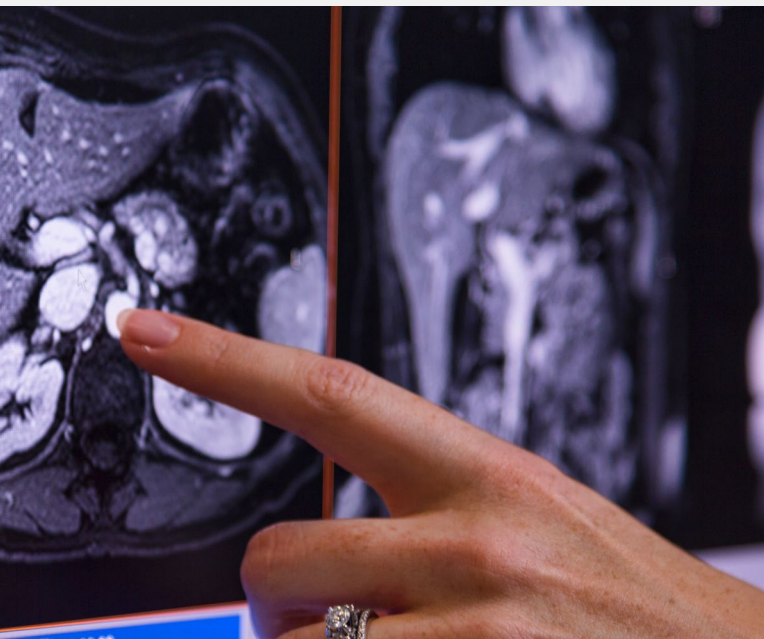
The new GGDPS inhibitors have nanomolar potency and are being assessed in vivo to determine pharmacokinetics properties and efficacy.



2021: FEATURED TECHNOLOGIES

MICROTUBULE TARGETED THERAPEUTICS, IMAGING AGENTS

New compounds allow cancer imaging, treatment



UNMC researchers have developed compounds that are capable of not only imaging and monitoring tumors, but treating them as well.

The new compounds specifically bind to protein-based structures called microtubules. Microtubules play a critical role in a number of cellular functions, and are a key target for treating a variety of cancers.

UNMC's compounds selectively target microtubules. The compounds can be safely labeled with various radioactive atoms that allow the compounds to be used for imaging (SPECT or PET) and therapy. When used without the radioactive isotopes, the compounds can help kill cancer cells and make them

- Microtubule-targeted radiopharmaceuticals
- Images and treats cancer
- Non-radioactive forms of the drugs can induce cell death
- Can be labeled with a variety of radionuclides

more susceptible to radiation therapy.

Microtubule-targeted compounds labeled with iodine-131 were tested in a mouse model of glioblastoma. Treatment with the compound significantly reduced tumor size and weight. Additional studies will look at the use of other radionuclides such as astatine-211.

SAMPLE COLLECTION DEVICE

Nasopharyngeal specimen collection kit simplifies, improves virus testing accuracy



Clinicians at the University of Nebraska Medical Center have developed a self-contained specimen container that collects and preserves nasopharyngeal specimens for testing.

The user inserts the collection device into the patient's nose and depresses the plunger. The pressure releases saline from one of two reservoirs, irrigating the nasal canal.

The saline then drains into the second reservoir—the specimen chamber—and mixes with a pre-agent to preserve the sample. The user then caps the device to seal all the ports and to prevent leakage.

The entire device is then transported to the laboratory for appropriate testing.

The collection device could be mailed directly to patients so they can take the test in the privacy of their homes. The patient would then mail the sample

chamber directly to the laboratory.

Traditionally, a nurse squirts saline into a patient's nose and then inserts a nasal swab for specimen collection, which could lead to false negative test results. The collection device prevents the type of false negatives that occur due to improper washing of the nasal passages.

This new sample collection device could be used in the clinic to test for a variety of viruses like SARS-CoV-2 and the more common influenza viruses.

- Alternative to traditional nasopharyngeal swabs
- One-stop solution for gathering, storing and testing nasal secretions
- Prototype available for review

NF-KB PATHWAY INHIBITOR

UNMC scientists invent new compounds to treat cancer

Researchers at the University of Nebraska Medical Center created a molecule capable of specifically inhibiting the NF-kB pathway, a key target involved in a variety of cancers and other diseases.

The NF-kB pathway is often overactive in a number of cancers. Therefore, new ways to shut off this pathway could yield important new cancer treatments.

Amarnath Natarajan, PhD, and his team developed a small molecule called 36-252 that destroys key members of the NF-kB pathway—specifically the proteins IKKb and IKKa. In ovarian cancer cell studies, 36-252 effectively inhibited cell growth at nanomolar

- Inhibits the NF-kB pathway
- Causes degradation of IKKa and IKKb
- Nanomolar potency in cell-based studies

concentrations, stimulated cell death (apoptosis), and effectively inhibited NF-kB activity. 36-252 was also effective at destroying ovarian cancer stem-like cells.

UNeMed is interested in forming collaborations with industry to further explore the potential of 36-252 as a novel therapy of the treatment of cancer and other diseases associated with overactive NF-kB.



GUIDED ENDODONTIC SYSTEM

Perform easy, precise endodontics...every time

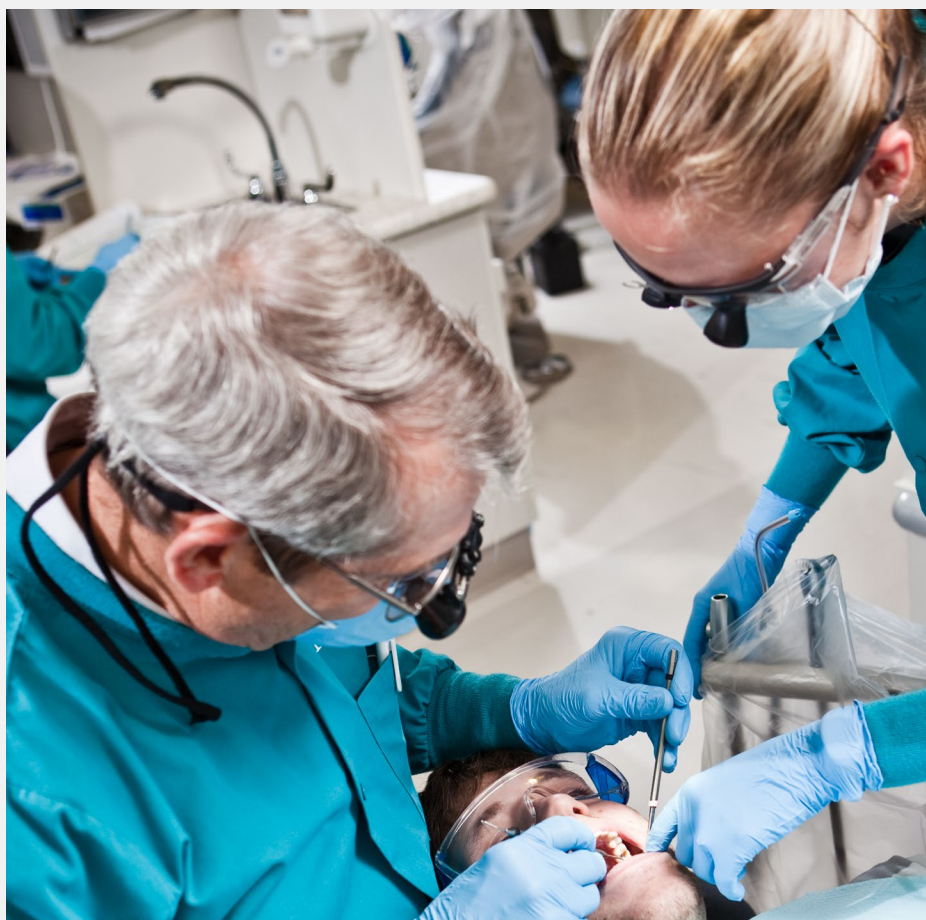
Guided dental implant surgery has become routine, but there are no commercial products for guided endodontics.

Greg Bennett, DMD, has developed a novel, complete system for endodontics.

The system includes drills, hollow channel posts, and guided sleeves. With this system, any dentist can easily and precisely initiate the endodontic access for treatment, create post space for the corresponding endodontic post, and remove the post via in situ obliteration.

Every dental office uses guided implant surgery. Soon, every dental office will use guided endodontics too.

- System includes drills, hollow channel posts, and guided sleeves
- Improved precision during both implantation and removal
- Optimized for guided endodontic access, post-space preparation, and post removal
- Designed to match the cutting end diameter of commonly used endodontic files



2021: FEATURED TECHNOLOGIES

SYNTHETIC BYPASS GRAFT

Innovative graft material flexes, improves blood flow for patients with peripheral artery disease



Researchers at UNMC developed a highly flexible vascular bypass graft for the treatment of peripheral artery disease.

Peripheral artery disease is a common circulatory condition for the elderly, with more than 3 million new cases per year. As the body ages, the vessels carrying vital oxygen and nutrients throughout the bloodstream begin to weaken and narrow, reducing blood flow to the limbs.

To reinforce the vessels, and support improved blood flow, physicians can surgically

implant grafts that protect the vessel integrity. However, traditional grafts tend to be rigid and risk severe bending and kinking during normal limb use. Grafts placed over major joints like knees and elbows have particularly high fail rates.

A team of researchers at UNMC, led by vascular surgeon Jason MacTaggart, MD, developed a synthetic graft material that is more flexible and prevents severe bending and kinking during normal limb use. Their tests indicate that such a graft may

- Reinforces vessels, supports improved blood flow
- More flexible, prevents severe bending and kinking
- Ideal for use in major joints like knees, elbows

improve blood flow patterns and reduce vascular torsion in patients with peripheral artery disease.

This new graft design may improve options for patients suffering from peripheral artery disease and offer a higher quality of life.

EASI-CRISPR

Get more out of CRISPR with new insertion protocol

The discovery of the new gene editing technology, CRISPR, was a dream come true for scientists everywhere. Never before could DNA be cut so cleanly and precisely. But CRISPR only solves half the problem.

While CRISPR can delete a specific segment of mutated or faulty DNA, the process for replacing that

piece has been unwieldy, imprecise and very inefficient. In short, CRISPR has the precision of a laser, while current DNA insertion methods are closer to bludgeons.

An international collaboration invented a better method to capitalize on CRISPR's strengths, while dramatically improving

- Insert larger DNA fragments
- Improve efficiency up to 83 percent
- No special equipment needed

efficiency of inserting new material by as much as 400 percent. The University of Nebraska Medical Center's Dr. Channabasavaiah Gurumurthy and Drs. Masato Ohtsuka and Hiromi Miura at the Tokai University School of Medicine in Japan invented the protocol, which has a remarkably high rate of efficiency (up to 100 percent in some genetic loci).

As a research tool, the new protocol could have a profound impact in developing new genetically engineered model organisms, including animals, cells and plants, and other testing media that could lead to future cures of genetic conditions.





tech transfer for nebraska

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2021 ANNUAL REPORT

UNeMed

Tech transfer & commercialization for
the University of Nebraska

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