

From left, scientists Patrick Sachs and Robert Bruno, and doctorate student John Reid work with the 3D printer they redesigned.

Researching outside the box

Cancer scientists make 3D printing more accessible

By Irvin B. Harrell

Biofabrication. A big word with immense possibilities.

Just ask Old Dominion University scientists Robert Bruno and Patrick Sachs. They have been using biofabrication to further their cancer and stem cell related research, and doing so without the luxury of a high-priced bioprinter.

“Bioprinters can cost hundreds of thousands of dollars,” said Assistant Professor Robert Bruno. “For that reason, bioprinting is usually



inaccessible to many scientists.”

Bioprinting – or 3D printing – enables the high-precision, high-accuracy, and high throughput generation of biological constructs that can contain extra cellular matrix scaffolds, cells, and biochemical factors in three dimensions. In other

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Dean's Message: Assistant Dean Debbie Bauman

College bursting with opportunities, events

February is the time of year when our programs receive admission applications which reveal that our applicant numbers continue to grow. Our graduate and undergraduate, online and traditional programs are well respected, highly ranked and prepare graduates to learn together and heal the world. Our applicants may not realize now how far ahead of the pack they will be with their ODU Health Sciences degree.

Two of our faculty researchers, Drs. Robert Bruno and Patrick Sachs, recently developed a way to biofabricate cells in a three-dimensional environment at a huge cost savings. Please read more about this research in this edition; you will be amazed. The innovation is praised as very influential and cutting edge.

The spring IPE Day will be very exciting. I started reading the book *Dream Land* by Sam Quinones (the keynote speaker). Our IPE Day discussions will be based on this true tale of the opiate epidemic, which has received much acclaim. The Interprofessional Education approach to the health, sociological and policy implications of the U.S. opiate misuse crisis has not been attempted before. A credible source leaked that a challenging case study will be unveiled during the student learning activity. That same source said the IPE committee has other exciting surprises up their sleeves. See you there – don't miss it!

The Dental Hygiene Continuing Education Weekend is approaching and will kick off the 50th anniversary celebration of an outstanding school. The event has a rich history and attracts scholarly presenters and more than 250 dental hygienists from all corners of the U.S. on an annual basis since 2000. The weather promises to be very spring-like at the beach front venue. Alumni will celebrate the 50th anniversary with a reception on Saturday night.

One announcement for students and faculty members – May commencement ceremonies will be enhanced this spring. ODU has added a separate ceremony for advanced degrees that will take place on Friday, May 5 at 7:30 p.m. The Provost has requested that faculty attend either the advanced degree or college ceremony. Commencement is a triumphant conclusion for those faculty and students who have dedicated themselves all year.

I wish you a successful spring semester!



Assistant Dean
Debbie Bauman

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From the Editor

Research can challenge on many levels

One of the things I've always enjoyed about being a journalist is the excitement of being handed an assignment, parachuting in and becoming sort of a crash-course expert. This is not to say that doing so is an easy task.

The first time I interviewed Drs. Robert Bruno and Patrick Sachs about breast cancer research, after just a short conversation with them my brain began to ache a bit. It took some work to decipher the who, what, when, why and how of their sophisticated research. But it made me smarter in the end.

Fast-forward to this month's cover story. When I finished writing it, I corralled the two scientists and had them read through my piece, anxiously awaiting a response on whether I captured the essence of their latest efforts.

The verdict: I was successful. It's pretty ingenious to take a 3D printer and use it to make its own accessories, thus boosting its research potential. It's no wonder that their work was highly recognized.



Irvin B. Harrell

Cancer scientists create cheaper bioprinting option

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words, it allows you to create a three-dimensional environment where you can study different types of cells and how they interact.

When Bruno and Sachs were able to get a three-dimensional printer in 2013, Sachs devised a plan to give it bioprinting capabilities. He used the device, which cost about \$1,200, to create its own attachments which in turn would convert it into a bioprinter – and it worked.

Working with John Reid, a doctorate student in biomedical engineering, Bruno and Sachs took some of the objectives that they laid out and using computer-aided design Reid was able to model something in a virtual 3 dimension that could be broken down into shapes the printer could understand and subsequently make into useable parts.

While the 1997 science fiction movie “The Fifth Element” dazzled audiences with a full human body version of bioprinting, don’t believe the hype, Bruno and Sachs say.

“Printing cells in the shape of a heart is not a heart,” Bruno says.

“Imagine the method by which a heart is made,” Sachs adds. “You’re born and during the process of development it has been growing in the context of a living organism. It’s got interactions from different cell types, it’s got ECM (extracellular matrix) that is surrounding it. It evolves receiving signals from other areas in the human body.”

When you bioprint organs, they lack the developmental connectivity to function in the way that organs in human beings do, they say. Thus, you get a clump of cells in a goo that form the shape of something that resembles an organ, but doesn’t function as one.

“Your liver doesn’t grow in a dish,” Bruno says. “These things develop in a spatially sensitive way.”

Not only have the two scientists found a way to bioprint

on the cheap, but they’ve made their innovations available to the scientific community. They published their work last year in the journal *Biofabrication*, and have made their designs downloadable from their website.

Their article, “Accessible bioprinting: adaptation of a low-cost 3D-printer for precise cell placement and stem cell differentiation,” was recently praised in the journal’s annual “highlights” edition as the “very best and most influential research published in *Biofabrication* last year representing cutting edge topics in this area of scientific research.”

As for where bioprinting is currently taking us, Sachs says, it’s a good tool for asking many different types of questions.

“We are also printing stem cells into 3D environments that closely resemble what would be found in the body to try and control the way they divide,” he says. “Of particular interest is the 3D printing of

“Printing cells in the shape of a heart is not a heart.”

— Scientist Robert Bruno

induced pluripotent stem cells. These cells are similar to embryonic stem cells, having the capacity to form any cell type, but are entirely generated in the laboratory from adult cells. ... This is a large departure from traditional culturing methods that almost exclusively rely on the growth of cells on a 2D plastic dish.”

But it doesn’t stop there.

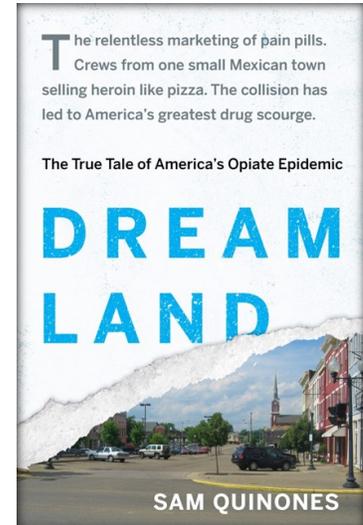
“Our current focus is using the bioprinter to study how stem and cancer cells interact with their environment to differentiate (i.e. change to become specialized cells),” Bruno says. “With cancer cells, we are printing them in ‘normal’ micro-environments, which we have already shown inhibits their ability to form tumors and directs them to adopt a normal phenotype (the subject of our Commonwealth Health Research Board grant).”

Some of the companies with expensive bioprinters are focusing on creating tissues they can sell to drug companies, Bruno and Sachs say.

“You can replicate all of the functional elements of the liver,” Bruno says. “This is important in drug discovery, drug testing and tissue engineering. You can learn how a drug is going to be metabolized. You can test toxicity or organ/cell reactions to drugs.”

INTERPROFESSIONAL EDUCATION

Opioid crisis to take center stage



Journalist will deliver keynote address at IPE Day 2017

This year's Interprofessional Education Day will focus on the health, sociological and policy implications of the nation's opioid crisis.

Sam Quinones – a journalist, author and former Los Angeles Times reporter – will be headlining the event on March 29 at the Ted Constant Center. Quinones is author of three acclaimed books of narrative nonfiction, the latest of which is “Dreamland: The True Tale of America’s Opiate Epidemic.”

His career as a journalist has spanned almost 30 years. He lived for 10 years as a freelance writer in Mexico, where he wrote his first two books. In 2004, Quinones returned to the United States to work for the L.A. Times, covering immigration, drug trafficking, neighborhood stories, and gangs.

In 2014, he resigned from the paper to return to freelancing, working for National Geographic, Pacific Standard Magazine, the New York Times, Los Angeles Magazine, and other publications.

Registration for IPE Day 2017 opens Feb. 17.

Old Dominion University College of Health Sciences turned 30 this year!



Please join us in celebrating this important milestone of 30 years of academic excellence by showing your support for the College of Health Sciences' future and making your gift today. Every gift makes a difference and helps us achieve our vision of advancing healthcare education and research through interdisciplinary and global collaborations.

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LEARNING TOGETHER. HEALING THE WORLD.

CENTER FOR GLOBAL HEALTH

Certificate provides exciting opportunities

The Global Health Graduate Certificate Program is growing as it moves into its third year. The program is full of exciting opportunities for students. The 15-credit program gives students the knowledge and skills to address health disparities and difficulties on a global level. Global health is relevant in a number of ways and in a variety of disciplines, so despite one's educational or occupational background, this certificate is perfect for those seeking global health knowledge to make an impact in their field.

The program is unique in that it is offered completely online. The program curriculum includes in-demand courses such as epidemiology, health management and research. The courses also will teach the need to improve access to care, health promotion, and the root causes of health problems of a population on a global scale rather than on an individual or national scale. By completing the program, certificate holders will be able to apply the knowledge and training from the program to work in health-related governmental and non-governmental agencies, university research programs, international healthcare consultancies and multinational corporations.

A recent change to the curriculum is the addition of the Interprofessional Study Abroad course in global health (HLSC 705/805). One of the upcoming study abroad trips that covers this course is the European Migration Crisis Service Learning Abroad trip during the summer 2017 term. Students will have the opportunity to travel to Munich, Germany, and assist organizations dedicated to integrating refugees. Students are encouraged to contact the Office of Study Abroad for more information about the program. Additionally, the Director for the Center for Global Health Dr. Muge Akpınar-Elci can be contacted via email makpinar@odu.edu or via phone (757)683-6160. If you are ready to apply to the program, please visit <https://online.odu.edu/admissions/graduate>.



Dr. Muge Akpınar-Elci

ALUMNI ACHIEVEMENT

Asmussen receives special honor

Kristine Asmussen, was selected by the Association of Environmental Health Academic Programs (AEHAP) as their Environmental Health Undergraduate Profile of the Month! The flyer can be viewed at their web site at aehap.org.

Asmussen recently led the planning of an event to help raise money for the Elizabeth River Project.

The mission of the Association of Environmental Health Academic Programs (AEHAP) is to support environmental health education to assure the optimal health of people and the environment.



Kristine Asmussen, right, poses with ODU graduate Barbara Gavin from the Elizabeth River Project.

A Woman of Distinction

Barbara Geraghty, a Master's in Public Health graduate in 2015, was named one of the YWCA of South Hampton Roads' Women of Distinction for 2017. An awards luncheon honoring Geraghty has been scheduled for April 27. Geraghty was instrumental in the success of the Center for Global Health's Let's Move project.



Barbara Geraghty works with students in the Let's Move project.

SCHOOL OF DENTAL HYGIENE

Homeless project provides oral screenings

Students and faculty members from the Old Dominion University School of Dental Hygiene provided free dental exams, oral cancer screenings and cleanings for 36 homeless individuals from around the Hampton Roads area on Jan. 27.

In addition to dental care, this annual event held at the Scope in downtown Norfolk offered many free services for homeless men and women including medical and eye exams; help in obtaining ID cards, legal assistance and food stamps; and providing details about other services.

The ODU dental hygiene care was coordinated by full-time faculty member Sharon Stull and included 37 senior dental hygiene students and 11 dental hygiene faculty. The School of Dental Hygiene has participated in this event every year and the senior dental hygiene students felt the event helped enrich their education and increased awareness of community oral health needs for at-risk populations.

Even more importantly many of the patients seen at this event had not been seen by a dental health care professional for many years and were very appreciative of the dental care. The school provided more than \$9,000 in services this year and plans to participate again next year.



Jamie Curley and Ashley deTreville

Upcoming Events

February 2017

February 17-19	Winter Continuing Education Weekend, Sheraton Oceanfront Hotel, Virginia Beach
February 22	Dean's Student Advisory Committee Luncheon, 12:00 -1:00 p.m. Dean's Conference Room
February 25	Scholar's Day - COHS

March 2017

March 6-11	Students Spring Break
March 7	Program Director's Luncheon, 12:00 -1:00 p.m. - COHS Computer Lab, Room 3014
March 15	SON, Culture of Safety Presentation
March 22 & 25	CE Course: Dental Radiation Safety Certification, HS Bldg.
March 25	Admitted Students Day Day of Giving
March 29	IPE Day, Ted Constant Convocation Center, Big Blue Room

April 2017

April 10	Military Appreciation Luncheon, 12:00-1:00 p.m., Location: COHS, TBD
April 24	Spring Classes End
April 24	COHS Awards & Recognition Luncheon, 11:30 a.m., Location: Ted Constant Convocation Center, Big Blue Room
April 25	Reading Day
April 26	Exams Begin