THE INNOVATOR

OPTIMIZING COMBAT CASUALTY CARE

OCTOBER 2016

THE NEWSLETTER OF THE U.S. ARMY INSTITUTE OF SURGICAL RESEARCH

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CDR's Corner

Col. (Dr.) Shawn C. Nessen
Commander, USAISR

"Optimizing Combat Casualty Care"

Team ISR,

A lot has happened since the last time I addressed you in this column, and while everything that goes on at this Institute is important, it is impossible for me to talk about them all, but I would like to go over a few items that I feel are relevant to all of us as a team.

First of all, the Office of the Under Secretary of Defense for Personnel and Readiness released DoD Instruction 6040.47 for the Joint Trauma System. The purpose of the DoDI is threefold: is to establish policy, assign responsibilities and provide procedures to develop and maintain an enduring global trauma care capability supporting military operations with a comprehensive DoD Trauma Registry; it establishes the Secretary of the Army as the Military Health System lead agent for trauma care and recognizes the JTS as a DoD Center of Excellence; and it establishes an integrated Combatant Command Trauma System modeled after the JTTS, and a requirement to input data into the DoDTR to support the Combatant Command's mission requirements. I have reviewed the DoDI and believe in the goals of this instruction. It will take time to fully implement, but I believe that overall it will improve battlefield care.

The next area that I would like to talk about is reduction in manpower. As you may be aware of, the Army is in the middle of downsizing to from 570,000 troops to possibly as few 450,000 Soldiers by the end of fiscal year 2018. In 2016 the Army reduced by 15,000 Soldiers and another 15,000 Soldier reduction is going to affect us this fiscal year and then another 10,000 by the end of fiscal year 2018. This reduction in the Army is affecting every unit, to include our Institute. We lost 28 enlisted slots in our TDA. These losses can be mitigated by hiring civilians or contractors and I believe we will remain staffed and capable of completing our mission.

The last thing that I would like to mention are the results from the Command Climate Survey that you were asked to participate when I took command in July. I can tell you that overall we have many strengths as a command, but there are some issues that we need to address as well. In order to come up with solutions that are acceptable and sustainable, there will be a series of Town Hall Meetings the second week in November where I look forward to hearing your candid thoughts on anything you think the ISR can do better. We have a proud history of advancing care for our combat wounded and I am certain that together, as a cohesive team, we will continue to do great things. I appreciate everything that you do every day and I am extremely honored to be your commander.

ARMY MEDICINE

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SGM Says

Master Sgt. Natasha Santiago
Acting Sergeant Major

Greetings ISR Team,

It is that time of the year where we as an organization begin to prepare for the holiday season, leave the PCS season (traditionally the summer time for those of us in uniform), and for the more senior personnel, we are now in full stride with the DA centralized Boards for Officers and Noncommissioned Officers alike. As we enter the fall season this year, Oct. 1 is going to bring many changes to the enlisted ranks as outlined in Army Directive 2016-19 (Retaining a Quality Noncommissioned Officer Corps). The Army's Retention Program will be changing.

There are three major changes that I want to illustrate that are covered in this directive. The first was the change to the senior NCO Retention Control Points (RCPs). Soldiers may perform service on active duty up to the following RCPs or age 60, whichever occurs first. Staff Sergeants can serve until 20 years, Sergeants First Class (including those that are promotable) can serve to 24 years, Master Sergeants/First Sergeants can serve to 26 years and Master Sergeants/First Sergeants (P) and Command Sergeants Major/Sergeants Major can serve to 30 years. With the roll out of this directive, there is a plan in place to get those who exceed the aforementioned RCPs to transition from the military.

The second change is the re-designation of the Indefinite Reenlistment Program. It will now be known as the NCO Career Status Program. NCOs who were at 10 years or more were to be able to reenlist for an "indefinite" term under the previous program. Effective Oct. 1, IAW AR 601-280 and AR 140-111, NCOs Staff Sgt. and above must have more than 12 years on the date they reenlist under the NCO Career Status Program. That 12 year mark is when they can now reenlist under an "indefinite" status.

The last change that I am going to talk about is the Bar to Continued Service, which was formally known as the bar to reenlistment. This tool lets the Soldier know that his or her service may not be in the best interest of the Army. This is applicable to all ranks, regardless of the established RCP and maximum age for each rank. Soldiers who are serving under the NCO Career Status Program to include those transitioning from the AC to RC may be barred from continued service. Soldiers can overcome this bar, and those who do not, will be separated from the Army IAW AR 635-200 and AR 135-178. For clarification, those who are on an "indefinite" reenlistment can now have a Bar to Continued Service placed on them.

There are many changes happening; it is paramount for all Soldiers to continuously place their best foot forward. Always give 100 percent to each mission regardless of how large or small it is. Each thing we are asked to do fits into the puzzle of mission accomplishment; one missing piece will cause us not to achieve mission success.

One Team.
One Purpose!
Conserving the Fighting Strength!

On the Cover

USAISR staff were among the team presented the FY 2015 MG Harold J. "Harry" Greene Award for Innovation (Group Category) for developing the SAM Junctional Tourniquet. Formerly known as the Army's Greatest Invention Award, the MG Greene award is to recognize solutions that increase efficiencies, strengthen Army position and ultimately save lives on the battlefield.
Left to right: Patrick O'Neill, chief technology officer, U.S. Army Materiel Command, Dr. John Kragh, Col. Lance Cordoni, Col. Lorne Blackbourne, Michael Dubick, Ph.D.

Company Notes

Company Commander
Capt. Cleveland S. Bryant Jr.

First Sergeant and I would like to welcome the following Soldiers to the ISR family: Sgt. Brandon Cummings, Sgt. Chase Moore, Sgt. Jessica Fry, Spc. Michael Patterson, Spc. Arthur Shidler, and Pfc. Ryan Burgess. Please welcome these folks into the ISR family, if you haven't already.

Congratulations to Staff Sgt. Melissa Arizmendi and Staff Sgt. Pablo Sierra on receiving their promotable to Sergeant First Class. Congratulations to our graduates from the Basic Leaders Course: Spc. Aaron Liddle, Spc. Matthew Durant, Spc. Jorhan Ocasio, Spc. Amber Voelker, and Spc. Jordan Smith. Further, I would like to recognize our Distinguished Honor Graduate of BLC, Spc. Harvey Harper, who has demonstrated exceptional technical and tactical knowledge and skill noted by both cadre and peers in attendance . Please congratulate Spc. Harper and the above mentioned graduates when you see them around. Great job and well done!

Congratulations are also in order for Sgt. 1st Class Dustyn Rose who graduated from the Senior Leader Course this month as well. Sgt. 1st Class Rose made the Commandant's List and also received the Physical Fitness Award with a perfect score of 300. Great job and way to lead from the front!

We would also like to congratulate the NCO and Soldier of the Month for September. Sgt. Ryan Kriner was selected NCO of the Month and Spc. Neil Williams is the Soldier of the Month. Great job and keep up the good work!

Upcoming events: Semi - Annual APFT (Oct. 17-21), Columbus Holiday DONSA (Oct. 6–9). Flu vaccination through the month of October.

As we approach this year's Fall and Winter holiday seasons, be sure to maintain good health and sound well-being with the expected changes of weather. Continually challenge yourselves and each other every day, step outside of your comfort zones by seizing new opportunities and taking that leap. Time is a precious resource. Be effectively productive with the time that you have to develop personally and professionally. You are within a great environment of learning and study among great professionals. Continue to grow in every aspect of your lives.

Thank you all for everything you all do every day. Continually, it is truly an honor serving as your Commander and First Sergeant!
One Team. One Purpose. Conserving the Fighting Strength.

NCO of the Month
Sgt. Ryan Kriner

Soldier of the Month
Spc. Neil Williams

Sgt. Jimmy Pittman, left, inspects Spc. Neil Williams before the Soldier of the Month board Sept. 27.

The Making of an Army's Greatest Invention

A Commentary
By Steven Galvan, DBA
USAISR Public Affairs Officer

Something that I noticed when I started this job in 2011 were the numerous awards and citations presented to the U.S. Army Institute of Surgical Research. The ones that particularly caught my attention were the five Army's Greatest Invention Awards: 2004 (HemCon Chitosan Dressing; 2005 (Combat Application Tourniquet); 2007 (Damage Control Resuscitation of Severely Injured Soldiers); 2008 (Combat Gauze), and 2009 (Burn Resuscitation Decision Support System). So I was not surprised when a team of surgeons and scientists at this Institute were presented with the sixth award in September for Fiscal Year 2015 for developing the SAM Junctional Tourniquet.

While the name of the award has changed from the Army's Greatest Invention Award to the Major General Harold J. "Harry" Greene Award for Innovation, the intent of the award remains the same—to recognize the technological contributions of Army Soldiers and civilians who significantly improve Army readiness and Soldier performance. The USAISR team members who were recognized with the award are: Dr. John Kragh, an orthopedic surgeon and tourniquet researcher; Michael Dubick, Ph.D. Damage Control Resuscitation Task Area Manager; and Col. (Dr.) Lorne Blackbourne, trauma surgeon and former USAISR commander.

This is the fifth award presented to USAISR individuals or teams during the last couple of decades and all of these awards are for products that have been instrumental in saving lives of wounded warriors on the battlefield, as well as the lives of trauma patients in the civilian sector. So this got me to thinking and wondering how a product makes it from the proverbial "drawing board" to the hands of Soldiers on the battlefield overseas and first responders throughout the US?

I can't speak for how previous products were created from concept to final product, but I did get some information as to how the SAM Junctional Tourniquet started from an idea to a life-saving device from a couple of the team members who played a significant role in this project.

It all started about a decade ago, when then Lt. Col. Blackbourne traveled to the U.K. to present a research project at a conference. While visiting the Royal College of Surgeon Museum in London, he saw firsthand the first aortic tourniquet developed and used by Dr. Joseph Lister. While Dr. Lister is best known for introducing and promoting antiseptic surgical techniques and wound care, he also contributed to designing and producing surgical tools and techniques that are still used in operating rooms today like bone forceps, the chromic catgut suture, fracture steel pegs, and the list goes on to include the abdominal tourniquet. And yes, the mouthwash Listerine was named after him for his contribution to antisepsis.

Since Col. Blackbourne had deployed to Iraq and Afghanistan, he was aware of the need for a clamp-type device that could stop bleeding in areas where conventional tourniquets could not be applied (the "junctional" areas including the groin and armpits). In 2007 he was the primary author of a manuscript that described Dr. Lister's abdominal tourniquet and how that concept of an extremity tourniquet had not changed in 400 years and that it was time to expand the anatomic geography for bleeding vessel compression.

So in 2008 when he took command of the USAISR, he gathered a group of surgeons, scientists and researchers and told them that there was a need for a tourniquet that could be used on the torso to be used on the battlefield to stop bleeding without having to use the traditional method of applying pressure to the wound to trying and control the bleeding. An interesting thing that Blackbourne mentioned was that one of the attendees stated, "There's no way in hell that will ever work."

Another thing that Blackbourne mentioned was that Drs. Kragh and Dubick stuck with the project and saw it go from concept to realization. They were both active in testing similar devices that were available at the time and gathered data on the effectiveness of those devices. Kragh and Dubick eventually teamed up with members

SAM JT continues on page 6

Figure 1. Joseph Lister's Aortic Tourniquet (circa 1862).

Reprinted with permission. Copyright: Hunterian Museum at The Royal College of Surgeons of England.

SAM Junctional Tourniquet

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of a manufacturing company to design the SAM Junctional Tourniquet and along with doctors at Wake Forest University tested and evaluated the tourniquet. After years of testing the device and gathering data, it was deemed to be the best junctional tourniquet to be used on the battlefield.

And, to use an old cliché, the rest is history. Of course this is an abbreviated account of how this device was thought of, designed, tested and fielded to deployed troops. The SAM Junctional Tourniquet is in the hands of medics deployed with Special Forces, and according to Kragh, the device has been used on a wounded ally troop and worked in the manner that it was designed for. Kragh also acknowledged that there's still a long ways to go before all deployed warfighters will have their medics with this device, but that it's good to know that there's a device that can save lives that were once deemed as preventable deaths.

Who would have thought that a leisurely stroll through a museum highlighting medical history would be the inspiration to an innovative device that is needed not only on the battlefield, but in locations around the world where otherwise a trauma patient would bleed to death. The creation of this device was made possible through the relentless work of a determined team. It took a team as big as their dream to succeed, so they included corporate, academic, managerial, excecutive, doctrinal and research teammates.

I am fortunate enough to be in a position that I get to witness the dedicated staff at the USAISR work every day to come up with innovative ways to potentially save the lives of those brave men and women who selflessly put themselves in harm's way for our country. The award that was presented in September is number five, but from what I get to witness every day, I know that there are a lot more to come.

Left to right: Patrick O'Neill, chief technology officer, U.S. Army Materiel Command, presented the Maj. Gen. Harold J. "Harry" Greene Award for Innovation to Dr. John Kragh, orthopedic surgeon and tourniquet researcher, Col. (Dr.) Lance Cordoni Chief of Medical Consultants Division, Capability Development and Integration Directorate at the U.S. Army Medical Department Center and School, Col. (Dr.) Lorne Blackbourne former USAISR commander and trauma surgeon at the San Antonio Military Medical Center, and Michael Dubick, Ph.D., USAISR Damage Control Resuscitation task area manager. Also recognized at the awards ceremony were Dr. Jim Johnson, Executive Director, Center for Applied Learning, Wake Forest University School of Medicine and Lance Hopman, Director of Research and Development at SAM Medical Products.

USAISR Joins Effort to Develop Clinical/Research Stem Cells

By Steven Galvan, DBA
USAISR Public Affairs Officer

The U.S. Army Institute of Surgical Research at Fort Sam Houston, Texas, is among four organizations led by a nonprofit institute in San Antonio conducting research to develop the ability to manufacture stem cells for clinical and research use. The San Antonio-based biotechnology company, BioBridge Global, along with the USAISR, StemBioSys also from San Antonio and Maryland-based Rooster Bio Inc., have been awarded a $7.8 million contract from the Medical Technology Enterprise Consortium to conduct the research.

James A. Bynum, Ph.D., will be the primary investigator and lead the efforts at the Coagulation and Blood Research Task Area at the USAISR.

"At the completion of this project, the tangible products will include almost every component needed to enable end users to develop new clinic-ready medical products based on mesenchymal stem cells—all scaled to industrial levels," said Bynum.

According to a BioBridge Global press release, mesenchymal stem cells derived from human bone marrow are the most widely used type of stem cell in both research and clinical settings. Researchers in the growing field of regenerative medicine have difficulty acquiring mesenchymal stem cells in significant volumes while maintaining the processes that ensure quality.

"The need for significant volumes of mesenchymal stem cells at sufficient quality levels hinder the translation of laboratory findings into cell therapy products," added Bynum.

Stem cells are an essential component in regenerative medicine.

"Regenerative medicine is a novel therapeutic approach in which damaged tissues and organ systems are not just repaired, but completely regenerated," Bynum said. "Stem cells have the capacity to revolutionize the therapeutic approach and degree of recovery for Warfighters both on and off the battlefield."

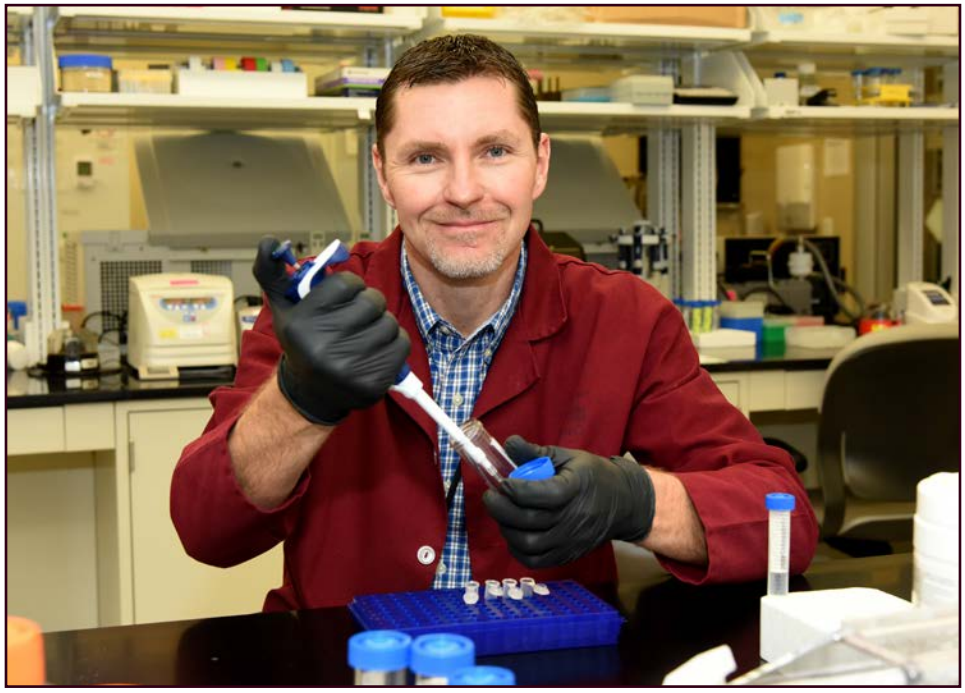
"At the completion of this project, the tangible products will include almost every component needed to enable end users to develop new clinic-ready medical products based on mesenchymal stem cells—all scaled to industrial levels."

James Bynum, Ph.D.

The U.S. Army Institute of Surgical Research, a subordinate organization of the U.S. Army Medical Research and Materiel Command, is collocated at the San Antonio Military Medical Center at Joint Base San Antonio-Fort Sam Houston. The USAISR's mission is to provide combat casualty care medical solutions and products for Wounded Warriors, from self-aid through definitive care across the full spectrum of military operations and to provide state-of-the-art trauma, burn, and critical care to Department of Defense beneficiaries and civilians.

The Medical Technology Enterprise Consortium is a group of industry, academic and other entities organized and operated through Applied Technologies International (ATI), a 501(c)(3) nonprofit corporation based in North Charleston, South Carolina. Its relationship with the USAMRMC is based on a prototype Other Transaction Agreement.

The command explored Other Transaction Authority, a special vehicle that federal agencies use to obtain or advance research and development or prototypes, in order to reach nontraditional contractors and small businesses. OT Agreements for prototype development are not subject to the Federal Acquisition Regulation. Additionally, private-sector funding is available for R&D in military medicine but is largely unreachable by the USAMRMC.



James A. Bynum, Ph.D., will be the primary investigator and lead the efforts at the Coagulation and Blood Research Task Area at the USAISR to develop the ability to manufacture stem cells for clinical and research use.

Safety Notes

By Stephanie L. Truss
Health, Safety and Environmental Specialist

Did you know that the focus on smoke alarm replacement comes as the result of a recent survey conducted by NFPA, which showed that only a small percentage of people know how old their smoke alarms are or how often they need to be replaced?

NFPA 72, National Fire Alarm Code®, requires smoke alarms be replaced at least every 10 years, but because the public is generally unaware of this requirement, many homes likely have smoke alarms past their expiration date, putting people at increased risk in the event of a home fire. According to an NFPA report, in one-fifth (20 percent) of all U.S. homes with smoke alarms, the smoke alarms aren't working; three out of five home fire deaths result from fires in properties without smoke alarms (38 percent) or with no working smoke alarms (21 percent). NFPA has been the official sponsor of Fire Prevention Week for more than 90 years. For more information on this year's Fire Prevention Week campaign, "Don't Wait: Check the Date! Replace Smoke Alarms Every 10 Years," visit www.firepreventionweek.org.

Did you know that Fire Prevention Week was established to memorialize the 1871 Great Chicago Fire? This tragic incident killed more than 250 people, left 100,000 homeless, destroyed more than 17,400 structures and burned more than 2,000 acres of land. This massive fire began on October 8th, 1871, but continued well into October 9th, causing most of the damage on the second day.

The biggest fire during this two day stretch, however, occurred in Northeast Wisconsin. The Peshtigo Fire, also occurring on October 8, 1871, is known as the most devastating forest fire in American history. It burned down 16 towns, took the lives of 1,152 people, and set 1.2 million acres of land ablaze.

Firefighters and public officials think about fire safety. This is why the anniversary of the Great Chicago Fire is observed in a way that informs the public about the importance of fire prevention.

Did you know that more fires start in the kitchen than in any other part of the home? The kitchen is a place that brings family and friends together,

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In the Spotlight

Chris Miller

Job title: Linux System Administrator

How long have you worked at the ISR? More than two years, first as a contractor for five months and currently as a GS employee for two years.

What or who has been an inspiration to you in your work? Can't say anyone in particular, however those who value liberty, critical thinking, honesty, entrepreneurship, setting a good example for others and truly leading from the front.

What is your favorite part of your work? Using technology to solve problems, and to automate redundant or repetitious work.

What is your proudest achievement? Successfully completing my Bachelor's and Master's degrees without taking on any student debt.

Short- and long-term goals: Short term: To successfully complete IT professional certifications like Red Hat RHCSA, Certificated Ethical Hacker and CISSP. Long term: Ideally retire to the countryside and take up organic farming.

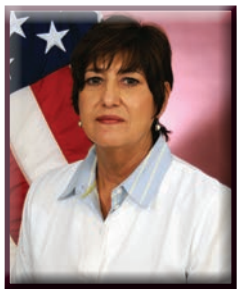
Hobbies: Shooting guns at the gun range, playing guitar, collecting guitar effect boxes, cooking, and hiking in and around the Texas Hill Country.

Favorite book: Too many to name, however currently *Mastery* by Robert Greene.

Favorite movie/TV show: Rarely watch any movies and I haven't owned a TV since 1998.

Favorite quote: *"All change is hard at first, messy in the middle, and so beautiful at the end."* Robin Sharma

Health News



By Maria G. Dominguez, R.N. COHN-S/CM Occupational Health

Hate to say good bye to summer, but finally Fall! Brisk mornings are now welcomed. Cool morning walks from the parking garage to the ISR building. And briskness continues in planning for the remainder of the year. Football weather and games. Hunting! Halloween, Thanksgiving, winter holidays! So this brings more outings, travel, friends and family visits. Hugs and handshakes. Visiting young children and the elderly as well. Sharing comfort and joy! And bacteria, viruses…Ugh!

Changing seasons also bring seasonal virus, seasonal influenza, and Pneumonia. According to the U.S. Department of Health and Human Services, fall's kickoff sparks the onset of flu season, beginning in the autumn months and stretching into as late as May. And in Texas Cedar Fever as well.

Common colds can affect anyone at any time of the year, but peak cold activity hits during the winter and rainy months, according to the University of Maryland Medical Center. There are over one billion colds reported in the United States throughout each year. Norovirus the most common stomach inflammation illness in the United States, commonly referred to as the "stomach flu", reaches its highest strength during the winter months. An extremely contagious virus, outbreaks spread from person to person, most commonly in long-term care facilities. Ear infections, especially in children, are more likely to occur in winter than any other season.

A virus that impacts children, mostly under the age of two, bronchiolitis is a swelling and mucus buildup within the smallest lung air passages, according to UMMC. The virus peaks in the fall and winter months. It most commonly is caused by a viral infection and is spread from person to person when coming in direct contact with nose and throat fluids of someone carrying the virus.

As Ben Franklin said: "An ounce of prevention is worth a pound of cure." So check all your vaccines are they current? Add the seasonal annual immunization protection. Especially infants, elderly and the immunocompromised. The CDC and UMMC recommend to wash hands frequently as the easiest way to prevent the spread of any of the illnesses. Disinfect counter tops, door knobs and other frequently touched surfaces often.

In Texas hunting risks include noise, firearm injury, ticks, rabies. Take hunter education. It is mandatory for anyone born on or after Sept. 2, 1971. Courses are offered all over the state and fill up quickly as the hunting seasons near in the fall. Texas Parks and Wildlife department offers free information on their website. http://tpwd.texas.gov/state-parks/parks/things-to-do/hunting. Although the weather is beginning to cool, there is still a risk for West Nile Virus. Mosquito season will continue for at least another two months. It is important to use insect repellant during outdoor activities, especially in the morning and evening. Don't forget your hearing protection! And goggles for Eye Injury Prevention Month.

Before the "Holiday Rush" give yourself a break on World Mental Health Day (October10). Remember don't let the year go by without checking your mammogram annual due date for National Mammography Day (October 21). Talk to your kids about drug prevention on Red Ribbon Week, October 23-31 and teach them about National Bullying Prevention Month. One last ounce of prevention: monitor the Halloween Candy this National Dental Hygiene Month.
Have a safe Halloween and Delightful Autumn!

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but unfortunately it's one of the most dangerous places in the home.

I urge you to take a look at all of sheets and share them with your friends and family. The overall theme of all the tips is to stay alert and be present in order to prevent fire, and be aware of what to do in case of fire.

Around the ISR

Top right: Sgt. 1st Class Dustyn Rose is presented with a graduation certifcate Sept. 22 by Sgt. Maj. Paul Ramos, Army North Surgeon chief medical NCO, during the Senior Leader Course graduation ceremony. Rose made the Commandant's List and the Physical Fitness Award.

Center right: Spcs. Jordan Smith, Jorhan Ocasio, Aaron Liddle, Harvey Harper, Amber Voelker, and Matthew Durant graduated from the Basic Leaders Course at Fort Hood, Texas Sept. 29. Spc. Harper earned the Distinguished Honor Graduate award. Photo by Sgt. Zeyar Htut.

Bottom right: Maj. Rebecca Morrell explains the mission of the Burn Rehab unit Sept. 8 to Col. Kim In Young, Commander, Republic of Korea Armed Forces Medical School.

Bottom left: Beverly Ash holds a gift card presented to her for taking first place in the Breakfast De-Lite Cook Off Sept. 1 as a fundraiser by the USAISR Special Events Committee.

Center left: Elsa Guerra cuts a cake to celebrate her birthday Sept. 1.

'Case Records of the JTS' Launched During CCC Symposium

Lt. Col. (Dr.) Jennifer Gurney moderates an educational program called "Case Records of the JTS" that was launced at the Military Health System Research Symposium in August. Photo by Laura Scott.

By Steven Galvan, DBA
USAISR Public Affairs Officer

The Joint Trauma System of the U.S. Army Institute of Surgical Research at Fort Sam Houston, Texas "has been the driving force of so much change in military and civilian trauma surgery," that's according to Lt. Col. (Dr.) Jennifer Gurney, trauma surgeon and Trauma System Development chief at the JTS. Gurney added that changes in trauma care were made possible through data collected from more than 176,000 trauma records from the Overseas Contingency Operations in Iraq and Afghanistan in which Clinical Practice Guidelines were created at the JTS for deployed healthcare providers, as well as educational opportunities from current trauma cases.

To continue enhancing trauma care, Gurney formed an educational program called "Case Records of the JTS" that was launched at the Military Health System Research Symposium in August. The program was developed to review, teach and remember the challenging cases that have been encountered by deployed military trauma surgeons; the motto of this initiative is: *so that the lessons learned are not forgotten*.

"The lessons learned are just absolutely incredible," said Gurney. "I think that going forward as the operational tempo decreases that there's a lot of benefit to looking at the management of these challenging cases from the point of injury all the way back to the care in the states."

The inauguration of "Case Records of the JTS" was co-moderated by Gurney and retired Army colonel and former commander of the USAISR, Dr. John Holcomb, who presented challenging cases to the panel of surgeons from multiple military services as well as Allied nations. The panel prospectively discussed the clinical management of combat wounded patients by highlighting the unique aspects of combat surgery, the lessons learned and the importance of a systems-based practice approach to combat casualty care.

"The cases all come directly from the Department of Defense Trauma Registry," added Gurney. "I've gone through cases in the registry, solicited from surgeons who have deployed, and some interesting cases that I've had on my deployments and making case files for the program."

Gurney's intent is to have this program held at other military and civilian meetings and conferences because she believes that this initiative is beneficial to trauma surgeons in the military and civilian sector.

"Trauma is trauma anywhere and we have to be innovative," she said. "I believe that it's incredibly beneficial to hear other surgeons and to know how they think during certain situations and how they problem solve under challenging circumstances, whether a military or civilian trauma surgeon."

So far the program has had positive feedback and Gurney has been invited to moderate sessions at three separate military and civilian meetings later in 2016 and 2017.

"I hope that this is something that sustains into the future so that we can continue to learn and support the Warfighter," said Gurney.

The mission of the Joint Trauma System is to provide evidence-based process improvement of trauma and combat casualty care, to drive morbidity and mortality to the lowest possible levels, and to provide evidence-based recommendations on trauma care and trauma systems across the Department of Defense. The U.S. Army Institute of Surgical Research, a subordinate organization of the U.S. Army Medical Research and Materiel Command, is collocated at the San Antonio Military Medical Center at Joint Base San Antonio-Fort Sam Houston. The USAISR's mission is to provide combat casualty care medical solutions and products for wounded warriors, from self-aid through definitive care across the full spectrum of military operations and to provide state-of-the-art trauma, burn, and critical care to Department of Defense beneficiaries and civilians.

CELEBRATING SCIENCE

In this section the Combat Casualty Care Research Directorate endeavors to celebrate the dissemination of generalizable knowledge in the form of published manuscripts. One of the Combat Casualty Care Research Directorate's core missions is translation of knowledge gained through pre-clinical and clinical experiments in an effort to optimize combat casualty care. It is important to acknowledge and recognize the collective work of our investigators during this process. Hence, we plan on "celebrating science" on a regular basis.

Winners of the San Antonio Postdoctoral Research Forum held at the University of Texas Health Science Center at San Antonio

1st Place Award Winner

Corneal Endothelial Cellular Delivery Based on Mathematical Modeling and Nanoparticle Guidance.


Lauren Cornell

Lauren Cornell
Ocular Trauma
Cornell LE, McDaniel JS, Wehmeyer JL, Zamora DO, Lund BJ.

PURPOSE: The corneal endothelium is responsible for corneal clarity; however, it poses a challenge for clinicians due to its location, lack of regenerative potential, and reducing cell population with age. This study investigates human corneal endothelial cells (HCEC) loaded with magnetic nanoparticles as an alternative non-surgical technique cell delivery system to corneal transplants.
METHODS: Mathematical modeling based upon stokes law, gravity, and magnetic field strength was used to determine optimum nanoparticle loading for induced cellular movement across the aqueous chamber. HCEC were cultured in human endothelial serum free media containing 10ng/ml FGF-2, and loaded with super paramagnetic iron oxide nanoparticles (SPIONP). Cell lineage and cell viability of SPIONP loaded HCECs was evaluated using FACS analysis and CyQuant assays, respectively. Intracellular iron content was evaluated via Elzone particle analysis and Prussian blue staining. PCR analysis was performed to evaluate expression of CD200, ACTA alpha, ATPA1, GPC4 and Zo-1. Finally, SPIONP loaded HCECs were evaluated for inner cornea attachment.
RESULTS: HCEC maintained their endothelial lineage, as was confirmed by their simultaneous expression of CD200 and glycoproteins. Furthermore, verification of SPIONP internalization by HCEC was demonstrated by Prussian blue staining and Elzone particle analysis. Lastly, HCEC maintained similar viability ratios as unloaded control cells, and demonstrated the in vitro ability to attach to the backs of corneas, the target region of choice. A significant difference was noted in ATPA1 on day 3 of loading as compared to the day 1 time point.
CONCLUSIONS: Overall, studies showed that HCEC readily incorporated SPIONPs without changing the overall health of the cell. Furthermore, proof of concept studies performed here indicate that SPIONP-loaded HCECs can be incorporated onto the back of the cornea and potentially directed towards a specific target area by exposure to a magnetic field. Therefore, this cellular delivery system could be an effective alternative to corneal transplant.

2nd Place Award Winner (Tie)

Effectiveness of Silver Sulfadiazine Loaded Chitosan Microspheres and Adipose Derived Stem Cells embedded in fibrin gels in an infected rat burn wound model.


Jaideep Banerjee

Jaideep Banerjee
Burn Injury
Banerjee J, Seetharaman S, Wrice NL, Natesan S, Christy RJ.

BACKGROUND: Infection is a significant challenge in burn care and cause breakdown of extracellular matrix (ECM) proteins, hindering the development of new blood vessels, thus impairing the normal healing process. Split Thickness Skin Grafts (STSG) take is severely impaired if there is infection at the graft site. Unless this infection is completely eliminated, improvement in graft take and novel cell based therapies will not succeed.
METHODS: Thermal contact 2 cm burn wounds were induced on the dorsal skin of rats using a circular disc heated to 85°C for 10 seconds. Twelve hours after injury the wounds were infected with Pseudomonas aeruginosa (107cfu/100µL of saline) and left overnight (12 - 14 hours)

to establish the infection. After twelve hours, the eschar was removed and treated with 50mgs silver sulfadiazine (SSD)-chitosan microsphere (CSM)-PEGylated fibrin gel. On day 9 wounds were further treated with adipose stem cell-PEGylated fibrin gel. Passage 2–4 ASCs were used for all experiments (5×104 cells/ml). ASC-PEGylated firbin gels were incubated in a 5% CO2 humidified incubator at 37°C until used for the treatment. Animals were euthanized on days 1, 4, 7, 14 and 28 and wound biopsies were taken and assessed for the healing outcomes.
RESULTS: CFU analysis and gram staining demonstrated that the combination treatment of SSD–CSM and ASC-PE-Gylated fibrin gels significantly reduced bacterial infection while overt infection was still observed in the control groups on day 14. Treatment with SSD-CSM and ASCs also resulted in greater production of anti-inflammatory cytokine IL-10 and decrease in pro-inflammatory TNF-α. A significant increase in neovascularization markers NG2 and vWf was observed. Histological analysis indicated that treating the wounds with SSD-CSM PEGylated/ASC firbin gel increased amount of dermal collagen matrix deposition, a thicker granulation tissue on day 21 and more mature collagen on day 28.
CONCLUSIONS: This work demonstrates that the combination treatment of infected wounds with SSD-CSM-PE-Gylated gels and ASCs resulted in reduced inflammation, a thicker granulation tissue and neo-vascularization.

2nd Place Award Winner (Tie)

Pirfenidone Reduces the Profibrotic Response in an In Vitro Model of TGF-beta-1-Induced Human Dermal Myofibroblasts.


Caroline Hall

Caroline Hall
Dental Trauma Research Directorate
Hall CL, Wells AR., Leung KP.

BACKGROUND: The wound healing processes following a burn injury often result in hypertrophic scarring. This type of fibrosis is characterized by chronic pathological remodeling of the dermal tissue leading to excessive production of extracellular matrix (ECM) and the formation of raised, thick, inflexible scars that are often functionally debilitating. The structural and functional alterations of the dermal matrix involve complex cellular and molecular interactions mediated in part by transforming growth factor-beta 1 (TGF-β1), a profibrotic cytokine that is overexpressed in the wound bed. TGF-β1 induces a fibroblast-to-myofibroblast transition whereby normal fibroblasts differentiate into the alpha-smooth muscle actin (α-SMA) expressing myofibroblast effector cells responsible for the overproduction of ECM and scar formation. Thus, some anti-scarring strategies aim to modulate the profibrotic activity of TGF-β1 during wound healing. Pirfenidone (PFD) is an FDA-approved anti-inflammatory and antifibrotic agent currently used for the treatment of idiopathic pulmonary fibrosis; however, the effects of PFD on dermal tissue are not well understood. We aim to characterize the antifibrotic mechanism(s) of PFD in an in vitro model of dermal fibrosis.
METHODS: An in vitro model of dermal fibrosis was established using differentiated myofibroblast cultures derived from normal adult human dermal fibroblasts stimulated with the profibrotic cytokine TGF-β1. Myofibroblasts were treated with varying doses of PFD given prophylactically, concurrently with TGF-β1, or as a therapeutic following myofibroblast differentiation. The effects of PFD on the profibrotic activities of TGF-β1-induced myofibroblast effector cells were determined in vitro.
RESULTS: An effective in vitro dosage was determined at multiple concentrations ranging from 0.1-1.0mg/mL. While PFD treatment reduced TGF-β1-mediated dermal fibroblast proliferation at each time point tested relative to TGF- β1 stimulation, PFD was found to most significantly reduce growth when administered prior to or concurrently with TGF-β1. No major cytotoxic effects were associated with PFD treatment. Additionally, PFD significantly decreased myofibroblast markers, such as α-SMA protein expression, and was found to modulate kinase activity in several key cell signaling pathways involved in wound healing and fibrosis.
CONCLUSIONS: PFD is a potent inhibitor capable of reducing dermal fibroblast growth and transformation to a profibrotic myofibroblast effector cell type. The mechanism(s) by which PFD exerts its antifibrotic effects on myofibroblast activity in vitro appears to target multiple cellular signaling pathways, including the profibrotic TGF-β1-mediated pathway. With no major cytotoxic effects detected, PFD has potential as a novel therapeutic agent with both antifibrotic and anti-inflammatory properties for the treatment of hypertrophic scarring following burn injury. Further investigations into the in vitro effects of PFD on resident skin cells are currently underway.

Back When...

Can you guess who this ISR staff member is? This photo was taken in 1997 when he was a Seaman Recruit at Great Lakes Recruit Training Center, Illinois.

Last Month's Answer:

Nicole Caldwell
Nurse (Research) Systems of Care for Complex Patients

Submit your photo for publication in upcoming issues.

Library News

By Gerri Trumbo
Library Manager

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QT 104 H1767g 2016
Hall: Guyton and Hall's Textbook of Medical Physiology. 13th Ed.

QT 104 M489 2017
Medical Physiology. 3rd Ed.

QW 4 J41 2016
Jawetz, Melnick and Adelberg's Medical Microbiology. 27th Ed.

QW 25 P963k 2017
Procop: Koneman's Color Atlas and Textbook of Diagnostics Microbiology. 17th Ed.

QW 25.5 A629 2015
Antibiotics in Laboratory Medicine. 6th Ed.

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Keyes: Epidemiology Matters.

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Rabies. 3rd Ed.

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Hess: Respiratory Care: Principles and Practice. 3rd Ed.

WO 21 S781b 2016
Stahel: Blood, Sweat 7 Tears: Becoming a Better Surgeon.

WY 20.5 N97445 2015
Nursing Research: Methods and Clinical Appraisal for Evidence-Based Practice. 8th Ed.

WY 20.5 B393d 2016
Developing a Program of Research in Nursing.

WZ 345 G238h 2017
Garrad: Health Sciences Literature Review Made Easy.

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1300-1500
at the
Warrior and Family Support Center
There will be food, fun, and a costume contest.
We hope to see all of you there.
Sponsored by the USAISR Special Events Committee.