Welcome to CSTAR – Spring Edition

Welcome to the 2009 Spring Edition of CSTAR’s Innovation Update. Your feedback from the first issue has inspired us to better highlight the three pillars in our business model: research, health technology assessment and validation, and education. Also we have increased the focus on the ongoing research at CSTAR.

Your feedback and comments are most welcome and we equally welcome the opportunity to hear from you directly.

Christopher Schlachta MD  John Parker RN MN
Medical Director, CSTAR  Director, CSTAR
Actualizing CSTAR’s Potential: Q & A With Kirsten Krull-Naraj, IVP Surgery Services

Why is CSTAR important to the surgery services portfolio, to the London Health Sciences Centre (LHSC), and to London?

First for the portfolio, which includes not only LHSC but also St. Joseph’s Health Care, London (SJHC), CSTAR offers the opportunity to stay innovative and ahead of the curve in application of new knowledge to practice, and influence on how that knowledge is created. This is especially true for the surgical milieu and the surgical device milieu in particular. The collaboration in research between clinicians and engineering expertise at CSTAR helps fill the void in the research world of application of the generated knowledge to practical reality, and how that transitions to make a difference in the care provided to patients. For LHSC the CSTAR benefits can not only be felt in surgery. The Critical Care group for instance does simulation education for critical event response. I see the potential for more application in the field of clinical imaging, because imaging has such a large role to play in CSTAR as the nexus of surgery and the hybrid imaging world – the guided surgical procedure. Obstetrics might take a little bit more interest in the future. Finally, CSTAR is a business. To actually influence what kind of medical devices are created for surgical application or otherwise, could potentially be an economic driver that is important for London. By utilizing our London expertise from a number of different angles, including the surgical manpower that exists in the city, we can tap into the networking that can create quite a far reaching group of diverse clinicians, making CSTAR a hub where people collectively innovate.

What are the strengths of CSTAR?

Our strengths at CSTAR encompass our three pillars of research, education, and health technology assessment and validation. The first two I touched upon in the first question, but health technology assessment and validation is really a growing and important area for us. CSTAR can be used as a venue to understand and analyze what new technologies might be coming on the market and if they would have some positive application to clinical patient care. Head to head evaluations of technologies looks at their strengths and weaknesses to help us collect evidence to make an informed decision on which technology is important for us to adopt and which technology we should sustain.

What potential do you see in the CSTAR/ACVS/Ivey Business opportunity?

The CSTAR, ACVS (Animal Care and Veterinary Service) and Ivey Business opportunity is a partnership that can help facilitate the technology validation and assessment outlined in the previous question, allowing us to start influencing more upstream uptake of technologies and getting them to market quicker. This business venture allows industry to hear back quickly from us where to improve, what is working, and how to get their product to market faster. For CSTAR, this involvement gives us the chance to work with industry and actually influence some of the developments.

How do you think CSTAR can contribute to LHSC’s strategic commitment to simulation?

Very much. The strategic commitment was largely influenced by where we are headed with CSTAR simulation. Pieces of great interest to us are in keeping with our other foci of reducing adverse events, improving our risk-management within the organization and promoting safety in our care of patients. Getting people to work together as interdisciplinary teams helps them realize how their roles and approaches as teams can influence the whole safety approach to care. Through simulation, risks and unforeseen problems can be identified and resolved in a safe environment. CSTAR has offered opportunities for OR teams, for instance, to learn and practice new techniques,
becoming more proficient and confident in their abilities before they actually implement them on patients. It is not just the technical finesse that is required as teams, but also the communication link that we can see come alive in simulations that are more natural to the real environments. Simulation also allows us to get residents or new employees acclimatized and comfortable in the OR with procedures in a quicker period of time, and a safer environment.

**What do you perceive to be the biggest challenge for CSTAR?**

One of the biggest challenges is trying to get past the old image of CSTAR. This is still an impression that we are exclusively about robotic surgery. Although that is an important part of our role, it is necessary to recognize that CSTAR is open for business on a larger scale, with quite a lot of diversity. Also, it is not only for LHSC and St. Joseph’s to take advantage of what CSTAR has to offer, or even The University of Western Ontario (Western). We would like to attract more people from right across Ontario and Canada to take advantage of CSTAR.

Where would you like to see CSTAR progress in the next five years?

We are looking forward to the Kelman Centre opening and becoming a well established education simulation centre. It will potentially have a lot of influence on the future development of technologies not only in the surgical world but also in the imaging world and beyond. It will have a provincial role to play and we are discussing with the Ontario Health Technology Advisory Committee (OHTAC) to contribute to more field evaluations and help facilitate uptake of technology. The business sector and the clinician world will recognize CSTAR as the test centre for products, innovation, and practice improvement. Now it's just a question of getting people to imagine our vision, and take advantage of the opportunity. CSTAR also has influence on young people who do school placements at CSTAR. It gives them a unique look at the innovative side of health care. It is a fertile ground for innovation in so many different ways.

**CSTAR’s Industry Roundtable IV Expands Circumference**

January 9, 2009 marked the fourth, semi-annual meeting of CSTAR’s Industry Roundtable. The roundtable was attended by 36 representatives from 24 companies from across North America dedicated to advancing world class minimally invasive surgery technology, programs and services. CSTAR was pleased to welcome Biomet, Dräger and IBM, our newest partners to the table.

The roundtable listened to special invited guest Dr. Les Levin, Senior Medical and Scientific and Health Technology Advisor Head of the Medical Advisory Secretariat Member, Senior Management Committee of the Ministry of Health and Long Term Care of Ontario. Dr. Levin spoke about Health Technology Assessment and the opportunities for industry.

The meeting covered all aspects of CSTAR’s research and educational activities, milestones and future programming. The meeting addressed important current and future opportunities for CSTAR and its Industry Partners.

**CSTAR’s newest Industry Partners:**

![Biomet INC](image1)

![Dräger](image2)

![IBM](image3)

***Next Industry Roundtable Meeting is set for June 12, 2009.***
Minimally Invasive Tumour Ablation in the Lung: A Safe and Effective Alternative

Lung cancer is the most common type of cancer in the world, and the most common cause of death from cancer. Although the surgical removal of the cancer is a primary course of treatment, surgery is not an option for many patients with lung cancer. Alternatively, ablative therapy (e.g. radiation) is another course of treatment available. This is called brachytherapy. Interstitial brachytherapy is the implantation of tiny low-dose radioactive seeds into the cancerous tissue, currently via a long hollow needle. The advantage of this method is that it decreases exposure to healthy tissue. Unfortunately, any small diversion of the needle can lead to areas of considerable over or under dosage in the patient, and this method can also expose the health care team to hazardous radiation.

The Minimally Invasive Robot-Assisted Image-Guided Tumour Ablative project is a major initiative of the MIRATAT research group at CSTAR. The objective of the project is to develop a system that allows ablation to be performed on cancerous tumours in solid organs by incorporating minimally-invasive robotic assistance (MIRA), image guidance and intraoperative navigation.

Through small incisions on the patient’s body, and using robotic arms, electromagnetic navigation and real-time ultrasound imaging, the system can enable very accurate placement of the brachytherapy seeds while reducing exposure to radiation and discomfort for the clinician by improving dexterity and ergonomics. The use of the robot allows the surgeon access to deeper tumours. It also allows for greater safety for the patient as the surgeon has immediate access to injuries occurring during the procedure.

Some novel aspects of the system include: the ability to accurately rotate the ultrasound probe (bottom) in order to obtain a three-dimensional model of the tissue (inset), and an electromagnetic sensor attached to the tip of the stylet that deploys the seeds (bottom).

In vitro experiments showed a seed placement accuracy of $0.9 \pm 0.7$ mm when using robotic assistance and image guidance with the MIRA system.

The main outcomes of this work will lead to better cancer therapies by: 1) providing a safer and more effective treatment option for lung cancer patients who are not candidates for traditional curative therapies; 2) offering a treatment alternative for lung cancer patients who are not candidates for or choose not to undergo traditional treatments; 3) allowing more accurate and precise seed placement; and 4) allowing the health care team to implant radioactive seeds at a safe distance from the radioactive source. Our current work is focused on incorporating this technology into hand-held devices and passive devices, as well as to broaden the application of the instruments to perform biopsies and other therapies such as radiofrequency ablation, microwave therapy, cryotherapy and gene therapy.

This project is led by Dr. Richard Malthaner and Dr. Rajni Patel. Other researchers currently involved include Ana Luisa Trejos (Research Associate) and Dr. Harman Bassan (Postdoctoral Fellow).

This research was supported by the Natural Sciences and Engineering Research Council of Canada (NSERC) under grant RGPIN-1345 by the Canada Research Chairs Program (R.V. Patel); the Ontario Research and Development Challenge Fund under grant 00-May-0709, and by infrastructure grants from the Canada Foundation for Innovation awarded to the London Health Sciences Centre (Canadian Surgical Technologies & Advanced Robotics) and to The University of Western Ontario (R.V. Patel).
Laparoscopic Vs. Robotic Biliary Enteric Anastomosis

Utilizing the resources at CSTAR and funded by a Lawson Health Research Institute Internal Research Grant, Dr. Christopher Schlachta, Dr. Douglas Quan, and Dr. Ibrahim Al Gamdi designed a project to investigate whether it is more efficient to learn and perform complex minimally invasive surgery using the laparoscope or the da Vinci® Surgical System. Using a model derived of discarded animal organs from a local abattoir, surgeons practiced sewing a pig’s bile duct to the small bowel in a fashion that is representative of a high stakes human procedure. This complex surgery is an operation commonly reserved for surgeons with specialty training in liver and biliary surgery. The three surgeons, at varied levels of experience with both laparoscopic and liver procedures, performed the operation 30 times each: 10 in the traditional open method, 10 with the laparoscope and 10 with da Vinci, for a total of 90 biliary enteric bypasses. The findings showed that although all surgeons could perform the procedure most quickly using the open method if a minimally invasive approach were to be taken, the robotic surgery was much faster than the laparoscopic approach. The only exception to robotic superiority was that in the hands of a highly experienced laparoscopic surgeon the benefit was not as clear. “In the long term, as we move to more complex intra-abdominal procedures, especially those requiring advanced suturing, this project provides scientific, experimental evidence that it’s actually better to do it robotically from the outset rather than first trying to learn the laparoscopic approach,” says Dr. Schlachta. “This experience has already given us the confidence now to go on and perform some of these complex surgeries and bring the advantages of the minimally invasive approach into the clinical environment.”

Boston Scientific, CSTAR and ACVS Team up for Testing

In a partnership between Boston Scientific, CSTAR (LHSC) and Animal Care & Veterinary Services (Western), Dr. John Denstedt and his team are involved in a project focusing on a histopathologic assessment of bilateral ureteral stent placement in a porcine model. Ureteral stents are placed in the ureter - the tube that connects the kidney to the bladder - to help keep the passage patent. At this point, stents tend to cause hydronephrosis (swollen kidney), which although doesn’t interfere in the efficacy of the stent, it does have an impact on quality of life. This project will look at this issue as well as evaluate some novel designs of Boston Scientific’s new ureteral stent.
NHL Star Eric Lindros Visits LHSC and CSTAR for the

In November 2007, Eric Lindros announced his retirement from the National Hockey League, punctuating it with a $5-million donation to London Health Sciences Centre. The gift, the largest known one-time charitable donation from a Canadian sport figure, was recognized September 13, 2008 with the unveiling of the Lindros name atop of the building at LHSC, University Hospital.

The person who inspired the unprecedented donation, Dr. Peter Fowler, sent greetings via video from Qatar, where he has been setting up and running Saudi Arabia’s sport medicine program.

“I believe Dr. Pete Fowler to be simply the best. My contribution to the hospital is small compared to the great work the Fowler-Kennedy Sport Medicine Clinic does every day,” Lindros says of the surgeon and clinic that helped repair various injuries during his storied hockey career. “It feels good to be able to support a world-class organization that helps so many.”

In addition to supporting a fellowship at the Fowler-Kennedy Sport Medicine Clinic, Lindros’ donation assisted the hospital by capping a fundraising goal for the completion of a purpose-built building for the Lawson Health Research Institute - the research arm of London Health Sciences Centre and St. Joseph’s Health Care, London.

The Lindros Legacy Research building will house CSTAR, the Brent and Marilyn Kelman Centre for Advanced Learning, the Dr. Sandy Kirkley Centre in Musculoskeletal Research, the Matthew Mailing Centre for Translational Transplant Studies, and the Centre for Clinical Investigation and Therapeutics.

According to LHSC President and CEO, Cliff Nordal, “Advances developed at these centres will benefit patients around the world for generations to come through the training of healthcare practitioners, the pioneering of new surgical techniques and the sharing of research discoveries.”
The Honourable Minister of Health and Long-Term Care, David Caplan, received a glimpse into the work done at CSTAR during a tour of the facility on November 21, 2008.

Arriving with London area Members of Provincial Parliament Deb Matthews and Khalil Ramal, Caplan and his group were taken through the simulation labs and shown the future home of the Kelman Centre for Advanced Learning.

“It was fascinating to see the amazing work done by the team of researchers and scientists at CSTAR,” says Caplan. “Staff and physicians at LHSC should be proud of the knowledge and expertise available right here in London.” For CSTAR’s Director, John Parker, the visit was an important step in raising the profile of the organization and helping the province realize CSTAR’s potential.

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“The visit by Minister Caplan and the MPPs was a chance for us to show them both how much we have accomplished in the past and our plans for the future,” says Parker. “I believe the Minister was very impressed with the resources we have to offer and the direction we are taking.”

The building’s new name reflects Lindros’ contribution and the support given by the Legacy Giving Program at London Health Sciences Foundation from gifts made by generous donors through their estates or insurance.

After a brief ceremony at University Hospital’s Auditorium A, Lindros and Nordal made their way to the rooftop for the unveiling of the sign which guests in the auditorium were able to witness by closed-circuit video. The new signage symbolizes the completion of the building’s exterior.

The plans for the building interior have been approved by the Ontario Ministry of Health and Long Term Care. Once the tendering process is completed, the building interior will begin its final stage of construction which is anticipated to take about one year.

Unveiling of New Lindros Legacy Research Building

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Over the last 20 years, one of the most modern surgical revelations has been the introduction of laparoscopic surgery which has proven superior to open surgery in terms of patient recovery, duration of hospital admission, post-operative pain and complications. Despite this being associated with better patient outcomes, still only one in ten Canadians are having their colon surgery performed laparoscopically. This statistic is due to many factors, chief of those is that laparoscopic colon surgery (LCS) is a very technical procedure. Cancer Care Ontario and SAGES (Society of American Gastrointestinal and Endoscopic Surgeons) have recommended that surgeons complete at least 20 cases in a training environment to become proficient. Even though practicing surgeons attend weekend or one day courses offered to teach LCS, often several times, it is uncommon that they integrate this technology into their practice.

Recognizing this gap in skills transfer, especially to front line surgeons in community settings, Dr. Christopher Schlachta, Medical Director of CSTAR (LHSC) challenged himself to create a mentoring program that would help surgeons complete their 20 cases and gain the confidence to offer this procedure on a regular basis. Dr. Kevin Lefebvre and Dr. Kent Sorsdahl of Stratford General Hospital in Stratford Ontario worked with Dr. Schlachta over a period of 18 months to gain competence and refine their skills in this procedure.

Although neither surgeon had done LCS previously, they were each fully competent in traditional open colon surgery and other laparoscopic procedures such as gallbladder surgery. Out of the 20 cases Dr. Kevin Lefebvre and Dr. Kent Sorsdahl performed, Dr. Schlachta assisted in their Stratford operating room for the first 9 and simply attended, looking over their shoulder, for an additional 5 cases. The remainder of the procedures were performed with Dr. Schlachta acting as an interactive observer from his London office at CSTAR. During this tele-mentoring, Dr. Schlachta had the ability to watch the operation, talk with the surgeons, and also tele-illustrate on their monitors like we see during football broadcasts.

For a one-year period following the completion of the 20 case mentoring period the surgeons agreed to track their outcomes. Out of the 20 further colon resections they performed in that time, every patient who was a reasonable candidate for laparoscopic colon surgery had their surgery performed that way, while all patients who where not appropriate for this approach had standard open surgery. In other words, following the mentoring program there was a 100% uptake of the procedure to practice.

“This is the first time that this type of longitudinal mentoring and tele-mentoring program has demonstrated that you can get a very high level of uptake in training community surgeons, so this is a model for technology transfer,” says Dr. Schlachta, “It will have an overall benefit to patients and society to equip front line surgeons to be able to do more laparoscopic surgery.”

This project has received a lot of attention, having won a Ted Freedman Innovation in Education Certificate of Excellence (Health Achieve 2008, Ontario Hospital Association) and being nominated for an Award of Distinction (GTEC 2008, Federal Government). The follow up results and success will be presented at a SAGES conference in Phoenix, in April 2009.

The story doesn’t end there. In partnership with Ethicon Endosurgery there is active recruitment of other groups of community surgeons who would like to participate in the mentoring program. This provides the opportunity to train to a level of safety in LCS and continue towards the goal of increasing availability of these procedure benefits to all patients.
New Course Attracts International Surgeons

Forty three participants from across Canada, the United States, Europe, Africa and Australia attended CSTAR’s Ultrasound-Guided Regional Anesthesia and Anatomy Update last November. The three day course was designed to instruct participants on the latest techniques for delivering pain blocks using ultrasound.

Program Director Dr. Sugantha Ganapathy and 18 members of the international planning and faculty committee, designed the course to meet the needs of both basic and advanced participants in delivering effective pain management. Participants were treated to lectures by international faculty, such as Dr. Bernhard Moriggl (Austria), Dr. Peter Cheng (California), and Dr. Andre Boezaart (Florida), Dr. Krishna Boddu (Texas), as well as Dr. Vincent Chan, Dr. Jose Carvalho and Dr. Anahi Perlas from Toronto.

Anesthesiologist Dr. Peter Cheng from Kaiser Riverside Medical Center, in Riverside California, said “I have been in this field for a number of years…[but] with the level of faculty presenting at this update, I was able to learn as much as the participants, if not more.”

The course allowed participants the opportunity to learn and practice their techniques through many mediums including ultrasound imaging with ten local high school student volunteers. Katie Bettinger, a student from Mother Theresa Catholic Secondary School stated, “It has been really interesting and a fun way to get volunteer hours”.

Although the course has been established for 13 years, this was the first offering at CSTAR. Dr. Ganapathy worked closely with CSTAR’s Program Development Team in preparing her course. When asked about the CSTAR program and facilities, Dr. Bernhard Moriggl responded, “One of the best I have ever experienced, truly.”

CSTAR’s Varkey Ultrasound-Guided Regional Anesthesia and Anatomy Update 2009 will be offered November 28-30, 2009.
Rapidly changing techniques in minimally invasive cardiac surgery are motivating an increasing number of cardiac surgery teams to learn and adopt new technologies and procedures. That quest for knowledge is what brought a multi-disciplinary cardiac surgery team from Montreal to CSTAR.

The two day education and training workshop focused on the work of Dr. Bob Kiaii, cardiac surgeon and Director of Minimally Invasive and Robotic Cardiac Surgery at London Health Sciences Centre. Dr. Kiaii and his multidisciplinary team have achieved a number of significant milestones in robotic-assisted cardiac surgery including Canada’s first minimally invasive robotic-assisted mitral valve repair at LHSC. The procedure, using the da Vinci® robotic system, provides a minimally invasive alternative to conventional open heart surgery. Robotic cardiac surgery now comprises 80% of Dr. Kiaii’s practice with patients being referred to him from across Canada.

Under the mentorship of Dr. Kiaii and his cardiac surgery team at LHSC, the visiting cardiac surgeons and operating room nurses from the Montreal Heart Institute and Hôpital du Sacré-Cœur de Montréal (HSCM) were active observers of a live cardiac surgery case. In addition, the Montreal team practiced their robotic surgical and procedural skills for mitral valve repair within the simulated learning environment of CSTAR. This procedure is used to treat the narrowing or leakage of the mitral valve which is the “inflow” valve for the left side of the heart. “I believe that our successful visit will lead to future collaborations with Montreal, and has promoted CSTAR’s initiatives in both training and education,” stated Dr Kiaii.

“We were able to appreciate the very intuitive nature of the robot,” remarked Dr. Michael Pellerin, Head of the Department of Surgery at the Montreal Heart Institute, “And practice advanced techniques in mitral valve repair”.

“CSTAR is very pleased to support Dr. Kiaii’s cardiac surgery team-based education initiatives and to host the team from Montreal Heart Institute and HSCM,” says John Parker, Director of CSTAR. “As these and other centres across Canada adopt robotic and other minimally invasive surgical technologies, we are witnessing a growing demand for multi-disciplinary team-based training and London is becoming the destination of choice for this type of programming.”
Robotics Training Not Just for Surgeons Any More

Surgeons move over, the nurses have taken over CSTAR. The educational session, which was collaboratively developed by OR nurses from St. Joseph’s Health Care, LHSC and CSTAR’s education programming development team, was aimed to increase the knowledge and skills of OR nurses for the day-to-day support of London’s city-wide robotic surgery program.

The session included a pre and post test, a didactic session on the history of robotics with cardiac robotic surgeon Dr. Bob Kiaii and 6 hours of hands-on techniques and troubleshooting training. “It is important to utilize the robotic experience that we have in London, and continue to build the knowledge and skills of an already outstanding robotic surgical team,” stated Dr. Kiaii.

“The hands on sessions gave me the knowledge, skills and confidence to support the team in providing safe and competent care,” said Michelle D’Amico, an OR Nurse from University Hospital (LHSC).

“This is the first training program of its kind in Canada. Through collaborative development of this internal training program at CSTAR, both LHSC and SJHC have enhanced London’s city-wide robotics surgery program and its capacity to deliver safe and competent robotic surgery care,” said John Parker, CSTAR’s Director. “We are already planning to offer an expanded version this program.”

Initiative and Teamwork Key to Facilitating “Exceptional Patient Care”

For many years, tumours within the skull base’s complicated, bony anatomy were difficult for surgeons to access safely, resulting in patients often having a poor prognosis. Advances in both technology and microsurgical techniques have dramatically increased surgeons’ ability to remove as much of the skull based tumour as possible. Thanks to the collaborative effort between the Departments of Otolaryngology and Neurosurgery, that knowledge is being passed onto junior to mid level neurosurgery residents at CSTAR.

The eight residents were taught by Dr. Brian Rotenberg, Assistant Professor, Department of Otolaryngology – Head & Neck Surgery, The University of Western Ontario who was invited by the Department of Neurosurgery to spearhead the program. “It is through the teamwork of both specialties, as demonstrated during the course, that exceptional patient care is facilitated,” stated Dr. Rotenberg. Assisting in this course were Dr. Damian Micomonaco and Dr. Leigh Sowerby.

“We organized the course to allow residents to be exposed to the endoscopic technique outside the OR, in an environment where you are allowed to experiment and make mistakes without consequences,” says Godefroy Hardy St. Pierre, Neurosurgery resident who initiated the program.

Dr. Rotenberg intends to expand the program for 2010.
Upcoming Courses for Continuing Professional Development 2009

CSTAR’s educational docket for 2009 is ever expanding. The list includes returning successful courses as well as new additions. These courses allow surgical leaders from LHSC and the world to demonstrate, collaborate, and innovate on best-practices in minimally invasive surgery.

**CSTAR’s ENT Facial Reconstruction Update 2009**
**April 23, 2009 - New**
Dr. Corey Moore’s program will provide information from leaders in the field of facial reconstruction with tips of the trade and clinical pearls. This course will be valuable to the practicing surgeon or training resident that see patients requiring reconstructive procedures.

**The Society of American Gastrointestinal and Endoscopic Surgeons (SAGES) Resident Workshop: Basic Endoscopy and Laparoscopy**
**May 7 & 8, 2009**
SAGES is the second largest and the fastest growing general surgery society in America. Only offered outside the United States at CSTAR, Dr. Christopher Schlachta (CSTAR Medical Director) and SAGES provide residents from all surgical programs across Canada access to excellent skills training opportunities with this internationally recognized program.

**CSTAR’s Contemporary Treatment of Rotator Cuff Disease Update 2009 – New**
**June 5 & 6, 2009**
Dr. Ken Faber (LHSC), course director of this new program, is targeting North American Orthopedic surgeons, residents and OR nurses to provide an understanding of this disease and an introduction to the new technology available.

**CSTAR’s Advanced Video Assisted Thoracic Surgery Update 2009**
**June 10 & 11, 2009**
This two day course provides Canadian thoracic surgeons, residents and nurses the opportunity to investigate the latest technologies and techniques in the Thoracic world. Dr. Richard Malthaner, Course Director.

**CSTAR’s Varkey Ultrasound-Guided Anaesthesia and Anatomy Update 2009**
**November 28, 29 & 30, 2009**
At its new home at CSTAR, this long running high calibre course, will again be offered under the direction of Dr. Su Ganapathy. Historically packed with international faculty and participants spanning North America, Europe, Africa and Australia, participants will learn the newest techniques in block pain management.

For more information or to register for these or any other CSTAR course, please visit our website.