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UBC REPORTS

Tiny Magnetic Couriers Deliver Drugs

The use of magnets to draw capsules directly to cancer tumours and diabetic ulcers holds enormous potential, says researcher. BY HILARY THOMSON

Tiny drug couriers with magnetic personalities could offer new solutions for patients who need drugs delivered directly to tumours, diabetic ulcers and other disease sites.

Urs Hafeli, a UBC assistant professor of pharmaceutical sciences, is an expert in targeted therapies that use magnetism to get drugs where they need to go.

"I really want to get more magnetic therapies to patients," he says. "The theory is deceptively simple but we know using magnets to concentrate drugs in the body has enormous potential."

Tiny magnetic particles – magnetic microspheres – can be filled with drugs or radioactive materials to treat a variety of illnesses. Magnets applied outside the body attract the spheres to the disease site where they deliver therapeutics in a targeted way.

One of only a handful of investigators in Canada to work with magnetic microspheres, Hafeli is the only researcher in the world to explore how radioactive

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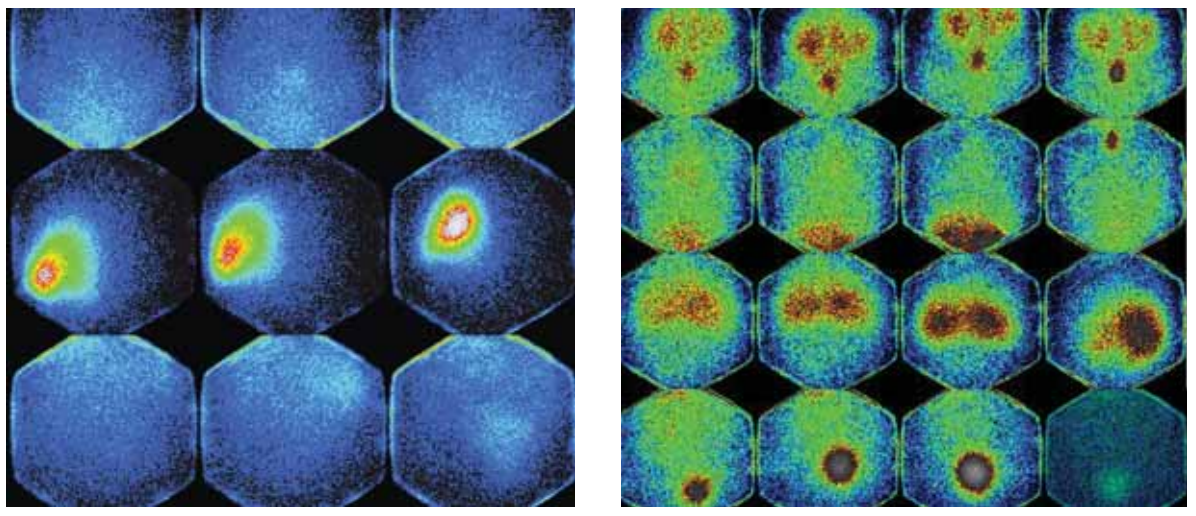

Drugs concentrate at target sites (l) thanks to magnetic microspheres. Traditional therapies circulate drugs through the system (r).

PHOTO: MARTIN DEE

Do You Really Want That Bite?

BY HILARY THOMSON

Resistance to signals from the "obesity hormone" may feed drive to eat, and contribute to the onset of diabetes.

How many of us have resolved to lose weight in the New Year? Quick, put down that hamburger and raise your hand.

Obesity, along with its debilitating partner, diabetes, is becoming recognized as one of North America's major health concerns. Scientists and clinicians know the two conditions are linked – but how?

Timothy Kieffer aims to find out. A diabetes researcher and associate professor in the departments of cellular and physiological sciences and surgery, Kieffer has recently received almost $300,000 over three years from the Canadian Institutes of Health Research to explore the connection between a hormone called leptin and the development of obesity and diabetes.

"We've learned that the mechanisms of obesity are complex – it's not a matter of gluttony," says Kieffer. "We also know that maintaining weight loss is difficult because people are fighting powerful hormonal effects, including the fall in leptin levels."

Leptin – also known as the obesity hormone – is normally produced by fat cells. It tells the part of the brain that controls eating how much fat you have, information that helps the body minimize changes in body weight. When an individual loses fat, leptin levels fall. The brain interprets the drop as a message that the body is starving and must eat more and conserve energy so body weight and leptin levels can return to normal.

Obese people produce lots of leptin, but are somehow resistant to its signals. Because it can't "hear" the signal, the brain thinks there is insufficient leptin and the stimulus to eat more and conserve energy gets activated. Kieffer believes that leptin resistance may contribute to the development of diabetes associated with obesity.

One of only a few researchers world wide looking at the connection, Kieffer's work could lead to new ways to control body

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Timothy Kieffer has found beefing up is only one ingredient in the recipe for obesity.

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IN THE NEWS

Highlights of UBC Media Coverage in December 2004. COMPILED BY BRIAN LIN

UBC Student Wins Rhodes Scholarship

UBC 4th-year biophysics student **Michael Rivers-Bowerman** has been awarded a 2005 Rhodes Scholarship, worth more than $100,000.

The award enables Rivers-Bowerman to spend the next two years at England's Oxford University, studying politics, philosophy and economics.

"I'm kinda surprised. I never thought I would wind up at Oxford," the 22-year-old told *The Vancouver Sun*. "This is just a tremendous opportunity for me to broaden my education, and at one of the finest universities in the world."

Rivers-Bowerman plans to return to UBC after the scholarship to study medicine and specialize in radiation oncology.

Postpartum Depression often Overlooked

As many as 80 per cent of women suffer from postpartum depression, making it the most commonly encountered illness following the birth of a baby, UBC psychiatry, ostetrics and gynecology professor **Shaila Misri** told *The Globe and Mail*. "Yet it's one of the ones easily missed."

While in most cases, baby blues fades after a couple of weeks, for 10-13 per cent of women, it can turn into lasting depression that features intrusive thoughts of harming their baby.

"They might see a knife in the kitchen and think: 'What if I stabbed this baby?' They might see the microwave and think: 'What if I put this baby in the microwave?' " said Misri.

To learn more about this serious form of depression, a screening tool of 10 questions will be distributed to general practitioners and family physicians across B.C. over the next few weeks.

Get the Laptop off your Lap

New research published in the journal *Human Reproduction* shows that laptops, combined with the thighs pressed-together posture needed to balance them, give off enough heat to raise the temperature inside testicles by nearly three degrees Celsius (5.4 F).

This increase could endanger the production of healthy sperm and lead to infertility, says study leader Yefim Sheynkin, a urologist at the State University of New York at Stony Brook.

"If [Dr. Sheynkin] can measure that difference in temperature [with laptop use], it is significant, but it needs more study," male-infertility expert **Victor Chow**, a consultant with UBC's Centre for Reproductive Health, told *The Globe and Mail*. "We need to know if it actually lowers sperm counts . . . or [if] the only thing you can say about it is that laptops heat up testes."

PHOTO: COURTESY OF THE VANCOUVER SUN

UBC biophysics student Michael Rivers-Bowerman is heading to Oxford as a 2005 Rhodes Scholar.

Daycare Centres Promised

Commenting on the federal government's recent commitment to build a national daycare program, UBC early education professor **Hillel Goelman**, who is a supporter of the universal model, says communities ought to be able to decide at the local level how best to deliver child care.

"We don't want to drop daycare centres all across the country. We have to ask ourselves, 'What do we need?' " Goelman told *The National Post*.

UBC research director **Julie Wagemakers** and computer science profesor **Karon MacLean** both have children at UBC's newly renovated daycare centres.

Wagemakers says she never would be able to give her two young daughters the resources they get at daycare at home.

"They've got a zillion musical instruments — drums, ukuleles, xylophones, everything," Wagemakers says. "Our two-year-old loves music, and that's not something we would have known had she been at home . . . It's a whole world built for little kids," says MacLean.

Orchid Centre Stage at Smithsonian

The Smithsonian has published a book called *Ultimate Orchid* to accompany the recently opened "Orchid Express" exhibit at the Natural History Museum Saturday, reports *The Columbus Ledger-Inquirer*.

The exhibit and book provide interesting facts and stories about the flower, including one where a Virginia collector bought an interesting plant from a roadside stand in Peru in 2002. He was sentenced last month to a $1,000 fine and two years probation for bringing home an orchid protected by the Endangered Species Act.

"The site where it was first found has been stripped of these orchids by unethical collectors, and it is now locally extinct," said a report from the Botanical Garden at UBC. "Happily, a population has been found elsewhere in a very remote location." The university did not name the place. □

UBC Rhodes Scholars

Former Prime Minister John Turner (BA '49), who recently led a delegation of election observers in the Ukraine, is one of UBC's better known Rhodes Scholars. Over the years many UBC students have earned this widely recognized and prestigious honour, established in 1902 to bring outstanding students from across the world to study at Oxford University in the interests of promoting international understanding and public service. Since 1979, eleven students from UBC have won the scholarship, currently valued at more than $100,000. □

UBC REPORTS

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Rest Easy: This Bed Can Save Your Life

BY MICHELLE COOK

A patient in a busy hospital ward has a seizure. Violent convulsions prevent him from calling for help. It's a scenario that nurses dread, but they also know it's impossible to watch patients every minute.

Now a group of UBC engineering students has developed a new bed monitoring system that lets health-care workers check on patients from a remote location. What started as a three-month class project has gone farther than any device on the market today to help keep track of patient movements.

"There are currently products out there that can detect a patient out of bed but nothing to detect whether a patient has been still for too long or is suffering from a seizure. Our device is based on cheap components and is extremely simple but it can do these things," says Hassen Karaa.

Karaa and fellow team members Shadi Safarkhah, Benjamin Chen, Matthew Wilder, Harjinder Gill, and Ahmed Abdi are all fourth-year undergraduate students. None of them knew each other before starting the project, an assignment for electrical and computer engineering professor Lee Iverson's instrumentation and design lab course.

The medical bed monitor is a thin pad that can be laid on top of a mattress. Health-care professionals can program it to check for a variety of conditions including epileptic seizures, attempts to leave the bed and prolonged periods of inertia in bedridden patients.

The waterproof pad is embedded with 24 sensors that send information via an Ethernet connection to a computer at the nursing station. The team designed a computer program to analyse the data being sent and developed a user-friendly interface for health care staff.

All a nurses have to do is input the patient's name and the condition they want to monitor. To monitor for bedsores, for example, they can input the time interval (e.g., every five minutes, 15 minutes) between alerts. The computer uses a time/date log to keep track of each patient's movements and can monitor several patients at the same time. Nurses can even choose how they want to be notified, and the computer will send them pop-up message on screen or an audible message such as "John Smith is having a seizure."

The team consulted with a biomedical engineer and several health-care professionals in B.C. and Ontario in order to come up with a product to meet their needs. They also studied video footage of people having seizures. To prevent false alarms the team incorporated a multiple detection function into the computer program.

"One of biggest challenges was getting the monitor to distinguish between seizures and normal movement in bed," says Matthew Wilder. "If someone is having a restless night, the bed monitor won't register this."

What started as a three-month class project has gone farther than any device on the market today to help keep track of patient movements.

PHOTO: BAYNE STANLEY

UBC Engineering students studied video footage of people having seizures to help design a medical monitoring bed.

The team's other big challenge was cost. With a $400 budget, they quickly realized they would have to settle for simple, easily available materials like carpet underlay and 50-cent tactile switches to use as sensors. They estimate their prototype cost about $200.

Most commercially available medical bed monitors cost between $800-$1,900.

Iverson says the group's key to success was a combination of good teamwork, keeping the project simple and an ability to listen carefully to what medical practitioners had to say.

After seeing a demonstration of the prototype, Alison Phinney, an assistant professor in UBC's School of Nursing, says there is a definite need for such a device in hospitals, geriatric and long-term care facilities.

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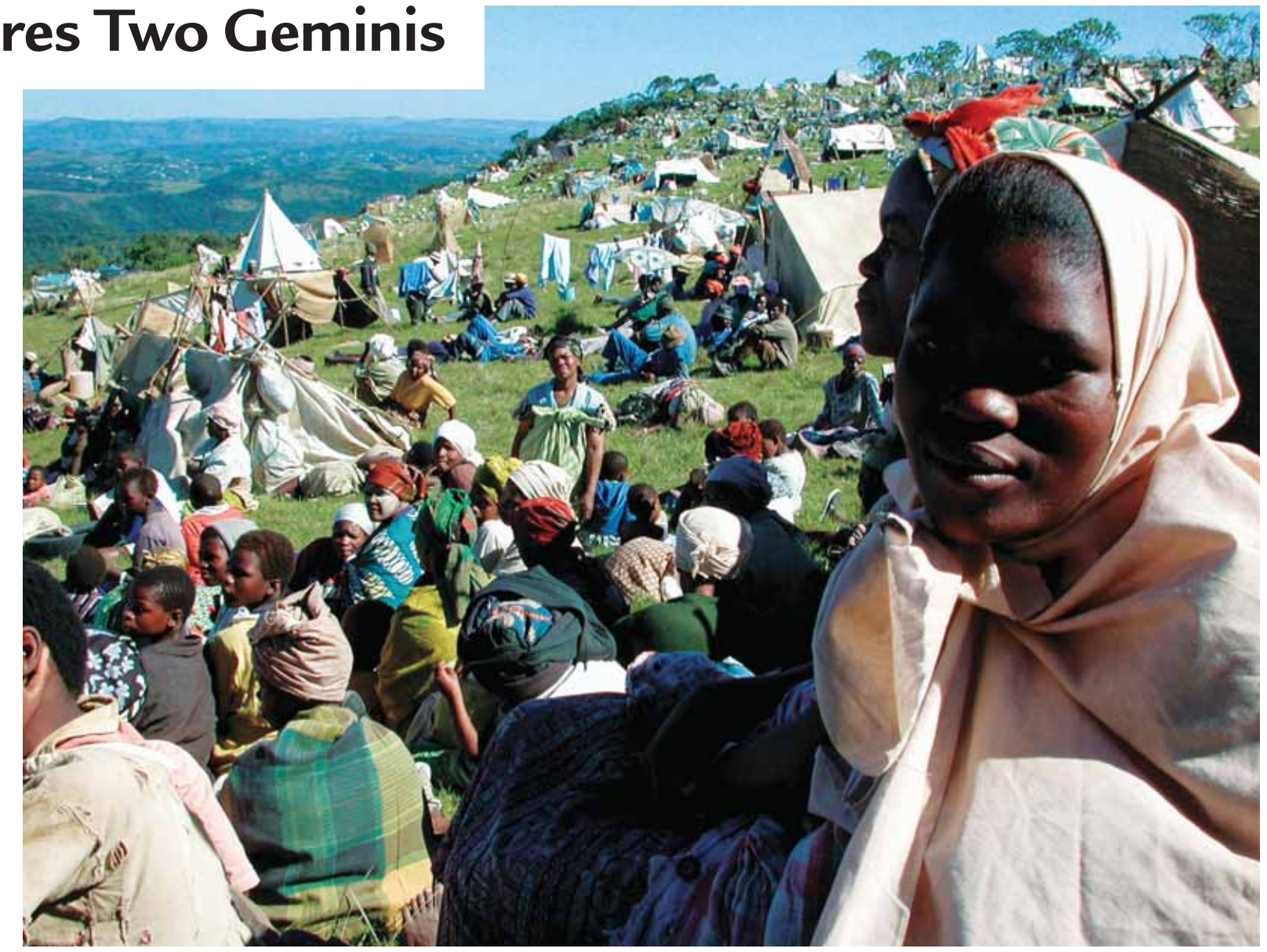
Prof Captures Two Geminis



Scene from Human Cargo, *co-written by UBC creative writing prof. Linda Svendsen(above, left), aired last January on CBC TV.*

Creative writing professor Linda Svendsen has been recognized for best writing in Canadian television. Svendsen and co-writer Brian McKeown recently won a Gemini Award for best writing in a dramatic program or miniseries for Human Cargo, the CBC TV miniseries on the plight of refugees. As producers of the series, the pair also captured the Gemini for best television movie or dramatic miniseries. With 17 nominations, the miniseries took seven Gemini Awards, the second-highest number ever awarded to a miniseries.

A $9-million dollar project, Human Cargo was filmed in Vancouver and South Africa, and aired as a six-hour miniseries on CBC TV in January 2004. During the early stages of development, support from UBC helped fund library acquisitions, office expenses and travel to African refugee camps, a mine and South African locations for research purposes. Svendsen has taught in the UBC Creative Writing Department since 1989.

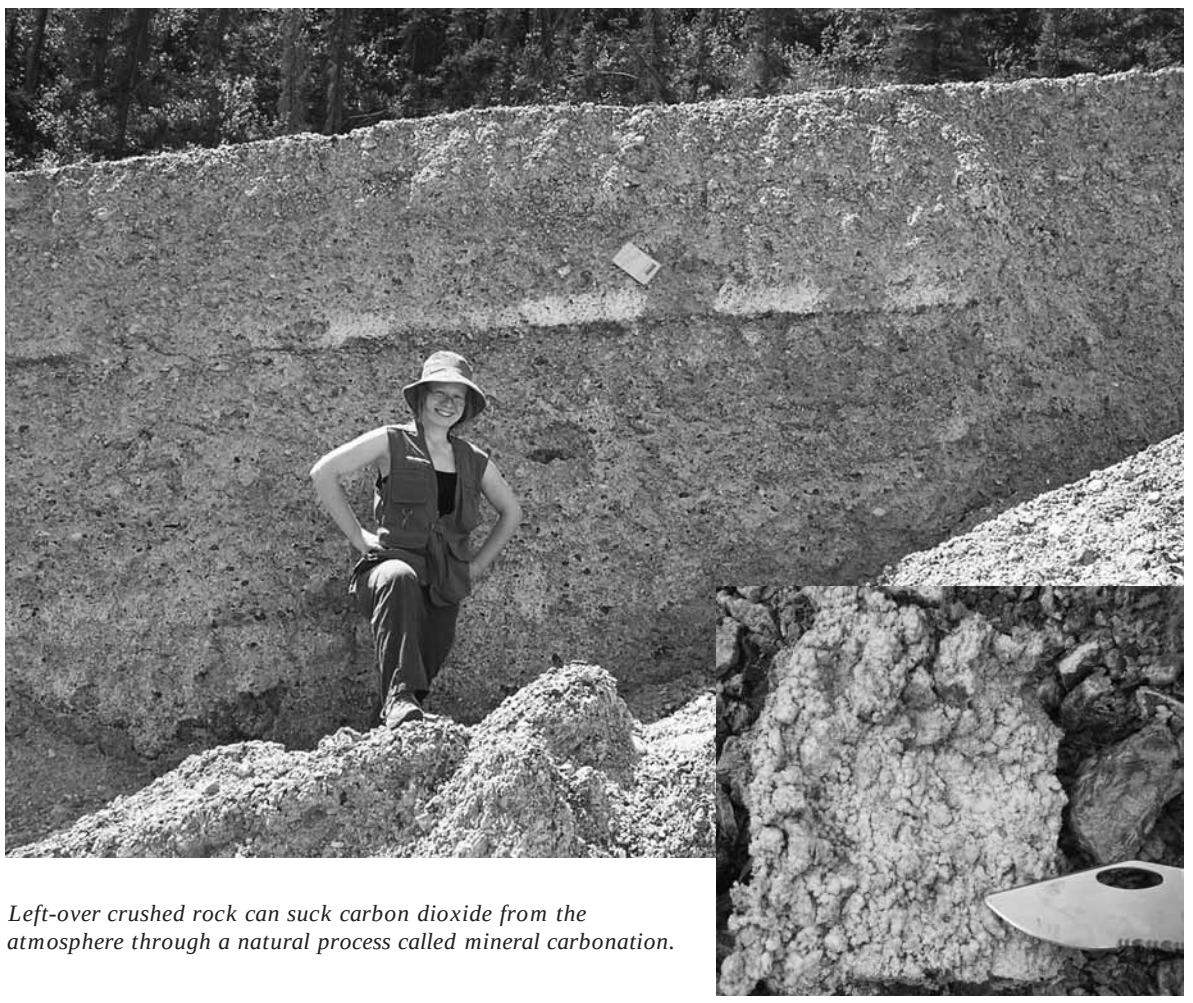
The Academy of Canadian Cinema and Television awards the Geminis to celebrate excellence in Canadian English-language television. Three other alumni from the UBC department of theatre, film and creative writing took the stage to accept Gemini Awards this year. Gavin Crawford (BFA '93) took best individual performance in a comedy or series; Brent Carver (BA '72) won best performance by an actor in a leading role in a dramatic program or miniseries; and Astrid Janson (MA '72) won production design or art direction in a non-dramatic program or series. □

Turning Gold into Green with Old Mine Tailings

Waste rock may help slow global warming, says geochemist. BY MICHELLE COOK

Long considered an eyesore and an environmental problem, mine tailings – the waste rock produced in the mining process – may actually be helping to slow global warming by absorbing the greenhouse gases thought to cause climate change.

Greg Dipple, an associate professor of earth and ocean sciences, has been studying the waste rocks' ability to soak up carbon dioxide (CO_2) and hold, or sequester, it for long periods. His findings could impact mining operations worldwide.



Left-over crushed rock can suck carbon dioxide from the atmosphere through a natural process called mineral carbonation.

Dipple first saw the phenomenon during a joint project in southern Quebec with Laval University. Working at decommissioned mines in Cassiar, northern B.C., and Clinton Creek, Yukon, for the past two summers, Dipple and his research team documented how the tailings – the crushed rock left over after the profitable ore has been extracted – suck CO_2 from the atmosphere.

"It was pretty exciting to see this. This is something that occurs naturally on geologic timescales," Dipple says. "We found that it happens quite quickly in mine tailings. We didn't expect that."

The effect is very similar to chemical weathering he explains, and occurs in tailings rich in magnesium silicate – such as those derived from nickel, diamond, chrysolite, platinum group elements and some types of gold mines.

In a natural process called mineral carbonation, CO_2 carried in rainwater reacts with silicate minerals on the surface of the tailings. The reaction binds CO_2 in a solid form to the rock where it can remain in a benign state for thousands of years.

Human activity releases about eight billion tons of CO_2 annually. With 500 million tons of waste rock in southern Quebec alone, Dipple thinks their potential as a CO_2 sink is significant.

"With tweaking, the tailings could soak up all the greenhouse gases that mining operations produce. I think it's possible that we could turn large mining projects into a greenhouse gas neutral industry," he says.

It's also possible that mines could soak up more than they produce, earning them carbon credits – the system being developed under the Kyoto Protocol, an international agreement aimed at reducing greenhouse gas emissions. The credits could be used to pay for mine reclamation. CO_2 credit futures currently trade for about CD$1.23/tonne at the Chicago Climate Exchange, and are predicted to increase in value to CD$10/tonne or more as the Kyoto Protocol is implemented.

Not surprisingly, mining companies have taken notice of Dipple's research.

"They didn't believe it at first, but now they're starting to call," he says.

But Dipple cautions that his findings don't offer a simple "throw it in a hole" solution to reducing carbon dioxide emissions. The next step is to figure out how to speed up the absorption process. Although Dipple and his team were surprised at how fast the process was occurring naturally in some mine sites, at others it was hardly noticeable.

The challenge will be to model and accelerate the natural reaction between the mine tailings and CO_2 at a cost that will be viable for mine owners.

"It's unpredictable because it all comes down to money," Dipple says. "How much money will they spend? Studies show it's possible to get an 80 per cent reaction in 28 minutes but only by spending lots of money."

Nonetheless, he is optimistic that industrial CO_2 sequestration could be in use in mines in the near future.

"I think we'll have substantial field tests running within five years," Dipple predicts.

He and his research team from UBC's Mineral Deposit Research Unit will continue their field work at an active mine in Australia in February 2005. □

"With tweaking, the tailings could soak up all the greenhouse gases that mining operations produce. I think it's possible that we could turn large mining projects into a greenhouse gas neutral industry."

Regulating Assisted Human Reproduction

UBC professor and reproductive health consultant Judith Daniluk talks about choices and dilemmas. BY ERICA SMISHEK

Biological mothers, surrogate mothers, gestational mothers, egg donors, sperm donors, *in vitro* fertilization – a lot has changed since the days our parents said they found us in the cabbage patch.

No one knows this better than Judith Daniluk, a professor in UBC's dept. of education and counseling psychology, and special education, who also serves as a reproductive health consultant at Vancouver's Genesis Fertility Centre and is the author of *The Infertility Survival Guide: How to Cope with the Challenges while Maintaining your Sanity, Dignity and Relationships*.

As the Canadian Government moves forward with the Assisted Human Reproduction Act, Daniluk and other specialists in the reproductive technology field are preparing for what impact the legislation will have on them, infertile couples and others they assist.

Daniluk recently sat down with *UBC Reports* to discuss the new Act, its implications and her continued interest in this ever-changing field.

PHOTO: MARTIN DEE

Technology is creating new opportunities, but we need to consider implications for children says Daniluk.

Q. The Assisted Human Reproduction Act prohibits certain activities and will regulate others with respect to assisted human reproduction and related research. Is it necessary?

A. We needed some general standards of practice. There are still bigger issues. For example, as a society we need to decide what kinds of services we believe should be provided and to what extent is there an obligation to ensure that the children who are produced through third-party reproductive options such as donor egg or donor sperm have the kind of information they need in terms of their social and medical history.

Technology has moved in leaps and bounds compared to what it was even 20 years ago. And questions arise literally daily in this area of health services. The question we need to constantly ask ourselves is "just because we can, does it mean we should?"

Q. You have been working in the reproductive technology field since 1982. How has it evolved?

A. The changes are dramatic. Each time technology affords another opportunity to try something new, it opens up a whole debate in terms of the long-term implications of what we're doing. For example, with assisted reproductive technologies we've pushed the age barrier at which women can have children beyond anything that was ever imagined before. Back in the '70s, even the early '80s, if you didn't have your first child by the time you were 30, people worried. Now it is becoming typical for women of 40, 42, 44, 46 to say, "I'm ready. I want to start having children."

The questions are numerous. I've worked with women who are in their mid- or late-40s married to younger men who have never had kids but really want them. The women have grown adult daughters. Is it okay for them to ask their daughters to give them an egg so that they can have a child with their new partner?

Is it okay for a woman who was born without a uterus to have her mother be the gestational carrier for her child? Is that okay? And what are the implications of that?

It's amazing what we're able to do now. And because we're pushing the envelope, even from a psychosocial standpoint, how do we make those determinations as to what the implications are going to be for the child down the road? Because that has to be taken into consideration. And to not do so is irresponsible as a society. But it requires the value judgments.

Q. Prior to the Act, I understand that most clinics used best practices from a medical standpoint as a guideline.

A. Even when you have your best practice guidelines, there are those heart-wrenching kinds of situations where you have to take the culture and the context into consideration when making those choices….

What do you about the young man who is 14, 15, 16 going through cancer treatments and as a consequence his parents want him to bank sperm. OK, fine. But who owns that sperm? What if he dies? And who has access to it? Or what about the couple who go through *in vitro* fertilization and have seven or eight frozen embryos. One of the couple dies. The other wants to use the embryos. Say it's the woman who is trying to create a child even though the biological parent will have died before the child is born. Is that okay? And who decides? These are some of the issues the act is trying to address.

Q. What fascinates you so much about reproductive health?

A. Some of the most fascinating issues are about the reconfiguration of family. Some of that is social, because we have so many more diverse family forms such as blended families and single parent families through divorce. But now there are more single women pursuing motherhood on their own using anonymous donor insemination. Women now have the choice. They don't have to wait for Mr. Right, or if they've waited and Mr. Right hasn't come along and their biological clock is ticking, they can become mothers on their own. There are also many more lesbian couples creating their families through anonymous donor insemination.

We are blurring gestational and genetic lines, and we're pushing age limits beyond anything we could have imagined even 20 years ago.

Q. After more than two decades, what keeps the whole area of reproductive health interesting for you both as a researcher and a clinician?

A. The field of reproductive health and medicine is hopeful because we're talking about creating life, we're talking about reconstructing family, we're talking about people having choices and being able to pursue options and if treatment fails, there is some peace for them in knowing they did everything they could and it just wasn't meant to be. My book deals a lot with coping with the stress of infertility and dealing with the grief of being unable to produce a child. I've had people shed tears in my office, I have shed tears with them over some of these situations. And yet, there is a light at the end of the tunnel and it is often a hopeful light.

Whether that is the creation of a family or whether it is moving on to a childfree life having done what they can or whether it is moving on to adoption or other parenting options, it is still moving forward and assisting people in that movement and that part is really exciting.

For more information on the Assisted Human Reproduction Act, visit http://laws.justice.gc.ca/en/A-13.4/2294.html

For more information on the Genesis Fertility Centre, visit www.genesis-fertility.com □

Get your MUSE Whenever, Wherever

BY BRIAN LIN

If you think your cell phones and PDAs have already transformed your life, get ready for a whole new array of daily applications. Soon these digital devices will be able to serve as your personal tour guide and real estate agent, among other things.

Providing the right information at the right place and the right time through mobile devices is at the heart of the groundbreaking Mobile Media-rich Urban Shared Experience (MUSE) project. Launched in July with a $1.29 million grant from Heritage Canada and industry partners, and led by UBC education professor David Vogt, the project aims to find the best ways to make such devices as responsive to their environment as people are.

So when you're mesmerized by Mona Lisa's smile, your museum audio tour – playing straight from your cell phone – won't rush you on to the next painting. And before you put a down payment on that dream house, your PDA could advise you of the nearest schools and grocery stores.

"With the advent of mobile devices and the availability of broadband technology, we're no longer tied to our computers and phones," says Vogt. "But as we roam around the city, we need access to information that will enrich our understanding of where we are, or simply make our lives easier.

"We want to find the best ways to make your mobile device and your surroundings work for you, together, to deliver the kind of information you need."

Made up of 45 industry leaders and researchers from a variety of disciplines, MUSE aims to leverage Vancouver's cultural, industrial and technological advantages – not to mention the 2010 Olympics – to make the city a mecca for context-aware content delivery.

"Vancouver is the perfect place to develop this leading-edge field. We already have well-established film, television, gaming and high tech industries," says Vogt. "And UBC, with one of the highest density of wireless hot spots in the world, is the logical place to test the technology."

One of the MUSE sub-project teams is already working on improving audio tours at UBC's Museum of Anthropology, while another is designing a high-tech heritage scavenger hunt in Chinatown, to be unveiled during next year's dragon boat festival at Science World.

Aptly named AMUSEMENT, the scavenger hunt game can be played on mobile devices currently available on the market and uses the industry standard 802.11 wireless network. Clues relating to Chinatown culture are sent to players' cell phones and points are given when they reach the correct location. □

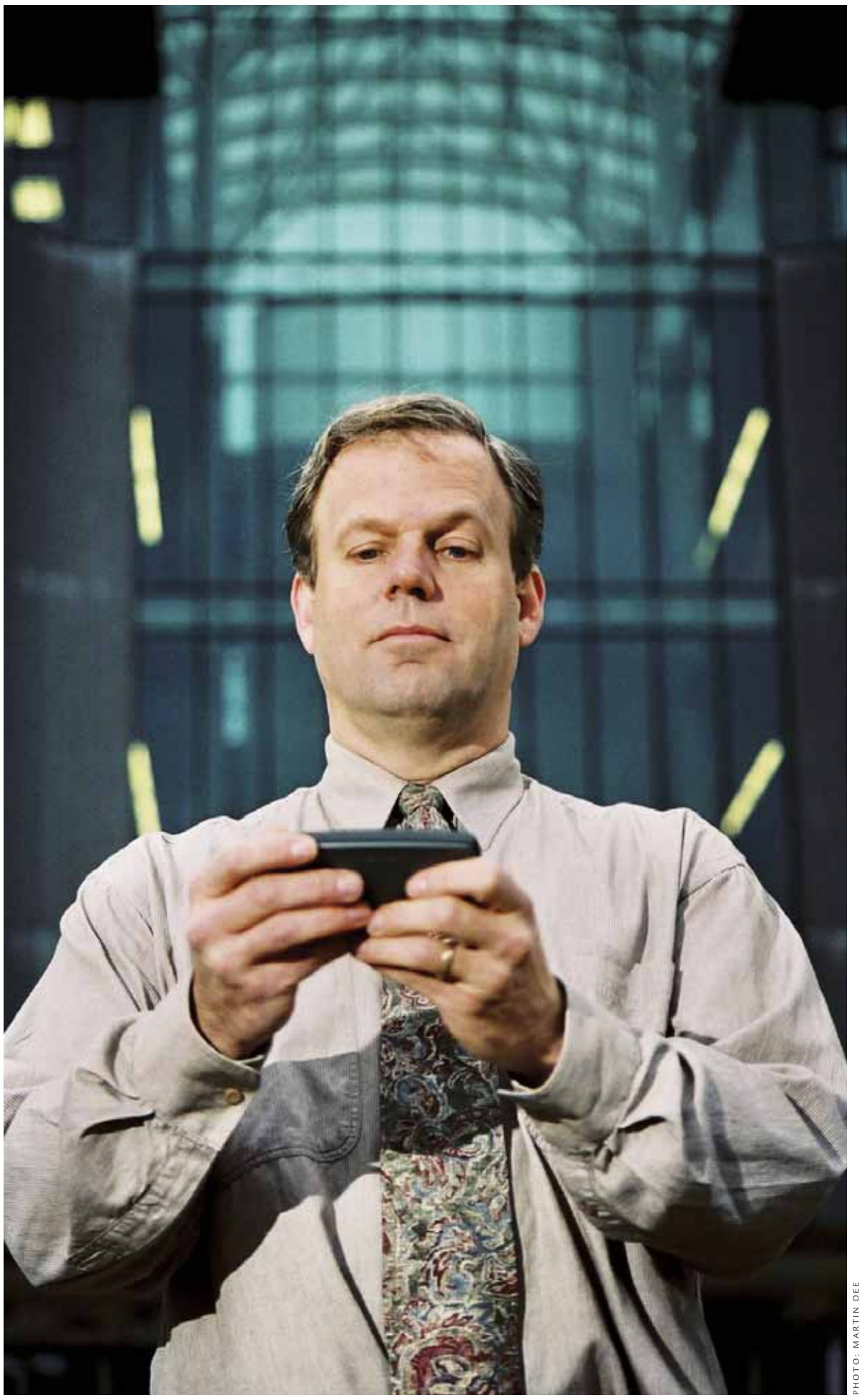


PHOTO: MARTIN DEE

MUSE director David Vogt is looking for more ideas that use context-aware mobile devices.

Overcoming Youth Voter Apathy

A special $297,000 project has been approved through MUSE aimed at increasing youth voter participation in the upcoming May provincial election. The project will involve students and engage them through interactive experiences such as voting on important social questions through their own mobile devices, and seeing first-hand the impact of their votes.

Supported by funding from Western Economic Diversification Canada, the project has already teamed up with student groups at UBC, SFU, UVic, UNBC and BCIT to create "mobile communities." Content specifically designed for mobile devices will be distributed amongst participants to engage youth through their own peers.

MUSE welcomes proposals of context-aware content delivery. For more information e-mail david.vogt@ubc.ca □

Drug Couriers

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An unknown scientist relaxes in a magnetized chamber to prove safety of magnetic forces.

magnetic microspheres can be used to treat several types of cancer.

One of Hafeli's ideas – which has not yet been approved for funding – is a magnetic bandage, which may offer a new solution for thousands of Canadians who face foot or leg amputation because of diabetic skin ulcers that won't heal.

Diabetic foot ulcers are sores that occur in 15 per cent of diabetic patients some time during their lifetime. The risk of lower-extremity amputation increases eight-fold in these patients once an ulcer develops, usually because of nerve and blood vessel complications of the disease.

Hafeli's idea has two steps. First, the wound site would be covered with thin but strong magnets embedded in a bandage. The next step involves injecting microspheres into blood vessels near the wound that are filled with slow-release, healing growth factors.

The magnets attract the microspheres to the immediate area of the wound site and stop them there. The spheres gradually break down and release growth factors over a period of weeks, allowing blood vessels and damaged tissues to re-grow and repair.

Hafeli, who arrived at UBC in July 2004, has recently applied for funding to support the investigation.

The beauty of magnetic microspheres, he says, is that they can carry highly active and sometimes toxic drugs that normally could not be tolerated within the body.

Small amounts of drug targeted magnetically to localized sites can replace large doses of drug that, using traditional administration methods, freely circulate in the blood and hit the target site in a generalized way only. Also, drugs within the sphere are protected from breaking down during transport and, because they are targeted instead of distributed in blood, don't harm some sensitive organs such as bone marrow.

Hafeli is exploring magnetic microspheres as an alternative to traditional radiation methods which

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Do You Really Want That Bite?

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weight and reduce the risk of diabetes.

In the new study, he will look at leptin's powerful effects on regulating blood sugar levels and how to reverse leptin resistance. Research on the leptin connection may lead to medications that could help people maintain a healthy weight and reduce the risk of diabetes.

"But medication to regulate leptin won't be a magic bullet," says Kieffer. "Fat isn't just a matter of genetics – diet and exercise do play an important role. How the body regulates weight is just a lot more complex than we'd earlier believed. Ultimately we hope to eliminate Type 2 diabetes by developing an approach that can be combined with diet and exercise to maintain a health body weight." □

Diabetes could Double in 20 Years

According to the World Health Organization, 177 million people were suffering from diabetes in 2000. By 2025, that number is expected to jump to 300 million. The U.S. Centers for Disease Control estimate that one-third of American children born in 2000 will develop the disease.

A huge drain on health budgets, diabetes care costs Canadians about $13 billion annually. The U.S. spent $132 billion to manage the disease in 2002.

About 80 per cent of patients with Type 2 diabetes (formerly known as adult onset diabetes) are obese. With more children becoming overweight, there has also been a steady rise in the number of kids with Type 2 diabetes.

Kieffer's study is also supported by the Michael Smith Foundation for Health Research.

For more information on diabetes, visit the Canadian Diabetes Association website at www.diabetes.ca and click on About Diabetes. □

Rest Easy

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"Nurses are always concerned about their ability to watch patients closely, and about patients crawling out of bed and then falling. Some health-care workers even move high-risk patients into the halls near nursing stations in order to keep an eye on them," Phinney says.

"In acute care, where patients are at high risk of seizure and in a setting where they are closely monitored already, having something like this in place would be a bonus. If there was something in the same price range as products now available but that did more and had a simple interface easy for nurses to learn and use, I think the health care community would welcome that."

What interested her was the monitor's ability to alert nurses when a patient is just starting to get out of bed.

"There are products out there, but these only tell the nurse that a patient is already out of bed and they have alarms that are loud and disruptive," says Phinney.

For her, the monitor's other important feature is that it can be set to alert nurses at specific intervals. This is important when people are sitting or lying for long periods and at risk of bedsores.

"You don't need to be sitting or lying for long for this to have an effect – even five to 10 minutes – and people die from these things," Phinney explains, adding that actor Christopher Reeve, who died earlier this year, died from an infection from a pressure wound (bedsore).

Encouraged by feedback from health-care professionals, Wilder says the team would like to see the device in use in hospitals some day but, he adds, "for us, the main success was not so much the innovation but proper consulting. When you're a consulting engineer, you need to listen to the client and that's what we did." □

The Harmonies of Human Conflict

BY ERICA SMISHEK

Pianist Rena Sharon (l) and percussionist Sal Ferrerras, teachers in UBC's School of Music, share an interest in how global issues affect music.

Is there a music of human security?

Paul Evans, acting director of the Liu Institute for Global Issues, posed the question to Rena Sharon and Sal Ferreras, teachers at the UBC School of Music and acclaimed performers working in divergent musical styles.

"Over lunch with Dr. Evans, we came to a meeting of minds," says Sharon.

Teaming up with other musicians, they recently presented an evening of musical and visual interpretations of human security called "Night of a 1000 Dinners" at the Liu Institute. They hope the event, a fundraiser for the Canadian Landmine Foundation, is just the beginning of continued collaboration and exploration in this unusual area.

"It has definitely ignited a certain spark," Ferreras says.

He and Sharon are an unlikely duo. Born in Montreal, Sharon is an internationally acclaimed pianist who began her life in chamber music at age eight; Ferreras was born in Puerto Rico and has explored his passion for percussion through world, contemporary and symphonic music. But they share a mutual interest in global issues and how music reflects various states of human conflict.

"I have always been interested in the ways that global issues intersect with what we do as musicians," says Ferreras, who is completing a PhD in ethnomusicology at UBC.

Sharon, meanwhile, has a keen interest in conflict resolution's role in chamber music. She co-directs the Young Artist Experience with Eric Wilson,pofessor of cello at UBC. It is a unique interdisciplinary chamber music camp for teens that blends intense music study with explorations in art, science, humanities, and global studies. Through it she has made many community contacts and is a supporter of the Liu Institute.

[Ferreras] came up with four pillars of conflict that populations can go through – catalyst, sustainer, reconciliation and renewal – and began to collect music that would apply to each pillar.

Provoked by Evans' inquiry, Ferreras considered how you would define the music of human security, how it has been used and how it would be organized. He came up with four pillars of conflict that populations can go through – catalyst, sustainer, reconciliation and renewal – and began to collect music that would apply to each pillar.

"Catalyst is the music of action, like a battle cry or a war song," he explains. "It elicits an adrenaline rush and transforms people from ordinary citizens to warriors or heroes."

He cites the Olympic theme as an example of a national affirmation linked to competition that helps people connect in an historical way to nobility.

Sustenance includes music that has grown out of national trauma, hardship and sorrow.

"It reinforces the collective spirit of a people," Ferreras explains. "It is music that joins people together, not so much for a cause, but as a way to identify with each other and to try to overcome the same trauma."

Examples include Argentine music from the 1970s, Central American music created during the civil wars of the 1980s, and most national anthems.

The music of reconciliation, Ferreras says, "is nostalgic, faith-based, often slow and repetitive like a sedative, it puts you in a state of receiving."

Examples at the Liu event included The Last Post, a traditional composition played at most Canadian Remembrance Day services, and a composition performed live by Persian tar master Amir Koushkani which is evocative of music prohibited in Iran and took the form of a set of notes designed for a very specific emotional expression and response.

"For countries that have gone through trauma, it's a question of what's left over? How do you forgive?" Ferreras explains. "In the case of South and Central America, people who were the oppressors are still there and people have to learn to get along with them. Music is one of the only devices that can bridge that gap, that polarity."

In the fourth stage – renewal – populations have gotten past the reconciliation stage and are seeing a real sense of transformation.

Ferreras points to the South African national anthem, which was written in the 1880s. Suppressed during Apartheid, it became very popular with the black population as a rallying cry and song for liberation. It eventually become recognized throughout the world and is now the official national anthem of the country.

Another example is On the Transformation of Souls, a John Adams work commissioned by the New York Philharmonic for victims of 9/11.

"It has a text built from the names of people who were the victims," he explains. "It is a huge expression of sentiment, an affirmation of values and recognition."

For the chamber music portion of the concert, Sharon was joined by her colleague Andrew Dawes, members of the Infinitus Quartet, and UBC opera student Mike Broder. The Brahms Piano Quintet was chosen for its diverse echoes of lamentation, ferocity, solace and energetic resolution. Sure on this Shining Night, Samuel Barber's luminous song, closed the evening with a contemplation of a place for humanity within a mysterious cosmos.

While Ferreras says there is no single approach to this musicology, he looks forward to further research on the subject. □

The Lessons of Chamber Music

BY ERICA SMISHEK

Rena Sharon would love to see diplomats and world leaders engage in a drumming session before any discussions or negotiations.

"It could become common international practice! Sal Ferreras could be the UN facilitator of Musical Unification Sensitization for Intuitive Communication, " Sharon says with a chuckle. "Everyone gets a drum and they just start a fabulously raucous musical dialogue. The collective sound is irresistible. You can't participate without feeling happy and energized. It breaks down verbal barriers and elevates the sense of the communal."

Sharon, a professor of collaborative piano studies at UBC, has been fascinated by the role of chamber music interaction as a model of conflict resolution and peacemaking since fall 2001 when she met General Romeo D'Allaire at a luncheon, hours after his lecture on his experience as the Canadian General in charge of the UN troops during the Rwandan genocide.

D'Allaire asked the pianist about her work and what makes chamber music creative. She told him how four musicians, who often don't know each other and may have very different interpretive ideas, come together to perform a piece of music that they all love. She explained that "there is no leader in chamber music – everyone gets an equal vote. Decisions must be arrived at through collective agreement, with no primary spokesperson, no veto powers, no hierarchy."

"Yielding to our colleagues can be emotionally, philosophically, and to a small degree even physically excruciating. And yet we all agree to compromise because the consequence of those concessions can be breathtakingly meaningful. You can't get there by yourself. Chamber music only really works when our most complex insights and most intimate emotions are shared and exchanged." □

Drug Couriers

continued from page 7

use highly penetrating radiation that is absorbed throughout the body. Its use is limited by toxicity and side effects. Hafeli loads his microspheres with radioactive tracers that emit beta radiation. Beta radiation consists of electrons that interact with cells within a one-centimetre range only, virtually eliminating side effects.

Spheres can be made of a variety of materials. Some – like albumin or gelatin – are biodegradable and others, such as glass, can reside in the body without negative effect.

Magnetic radioactive microspheres are applied in methods similar to non-radioactive spheres. A magnet, placed outside the body, is directed to the target site. The magnet can be a rod-shaped permanent magnet of any size or can be contained in equipment that looks like an open magnetic resonance imaging scanner.

The loaded microspheres are introduced into a blood vessel, and in as little as half an hour, they gather at the target site to emit radiation that kills surrounding cancer cells. The therapeutic action lasts until the radioactive material has decayed, usually a couple of days or weeks, depending on the material used. If necessary, the treatment can be repeated.

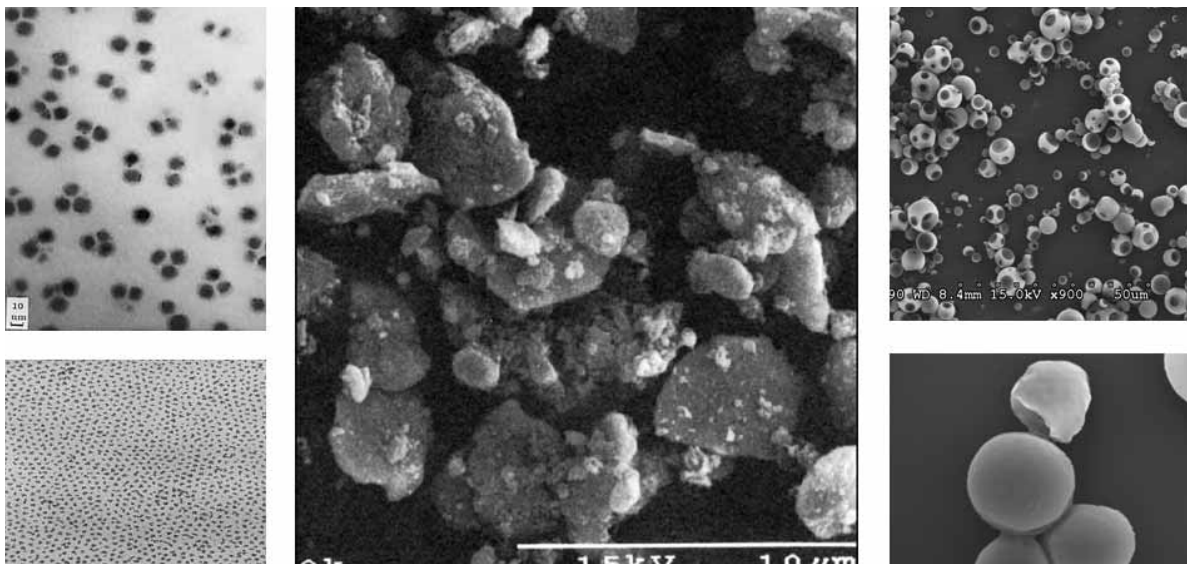

PHOTO: COURTESY OF URS HAFELI

Tiny magnetic particles – magnetic microspheres – can be filled with drugs or radioactive materials to treat a variety of illnesses.

Specializing in biodegradable spheres, Hafeli works primarily with polymers. He is exploring a number of factors that affect the therapeutic value of the technology. In this tiny treatment world, size matters. One challenge is to find new ways to make uniform-sized microspheres. In addition, the spheres need to be small enough to not clog the narrow blood capillaries.

In addition, spheres need to be peppered with microscopic magnetic particles, such as iron, so they will be attracted to the magnet. Hafeli is evaluating the toxicity of these magnetic nanoparticles as one part of his work.

"The theory is deceptively simple but we know using magnets to concentrate drugs in the body has enormous potential."

Although magnetic microsphere research is in an early stage, scientists have been exploring how the spheres can treat liver and brain tumours, and first results appear promising. Hafeli is also focused on improving magnetic microspheres so they can be used in a greater variety of treatments. He plans to investigate magnetic treatment of head, neck and lung tumours as well as finding ways to improve delivery of rheumatoid arthritis drugs to affected joints.

Determining optimum sphere size, effective magnetic forces and other factors takes the expertise of scientists in disciplines that include physics, chemistry, biology and medicine. Hafeli works with UBC collaborators at TRIUMF – Canada's national laboratory for particle and nuclear physics – and the departments of chemistry and chemical engineering. He also organizes international conferences of researchers and clinicians interested in magnetic drug carriers. The next meeting is in Austria in May 2006. □

TIMEPIECE 1925

PHOTO: COURTESY OF UBC ARCHIVES

Construction of UBC's Main Library. Photo taken January 1925.

Main Library Under Construction (January 1925)

BY CHRIS HIVES, *University Archives*

Designed by the architectural firm of Sharp & Thompson, the Library was one of the three original permanent buildings on the Point Grey campus. The Library's granite facing stones were quarried on Nelson Island in Pender Harbour and barged to the foot of the Point Grey cliffs. From there they were hauled to the building site using an aerial tramway and light railway system. Two wings (1948, 1960) were added to the original structure.

Currently the site of extensive construction and renovation activity, the Main Library is being transformed into the Irving K. Barber Learning Centre. The project will result in the removal of the building's two additions and a new structure will wrap around three sides of the original Library building.

Opening of the new Barber Learning Centre is scheduled for late 2006. □

E I E I Ouch!

Psychology student examines how children express pain

BY ERICA SMISHEK

UBC researcher studies the many ways kids say "ouch."

Scraped knees, bumps and bruises, tummy aches, immunizations – in an average child's early years, pain is a daily reality. For sick kids, that pain can be chronic and even more intense.

Yet young children between three and six years of age may not have the verbal skills to efficiently communicate the type of pain or the magnitude of discomfort they are experiencing.

"A three- or four-year old may not even understand what the word 'pain' means," says UBC psychology graduate student Elizabeth Job.

Job, under the supervision of professor emeritus Ken Craig and former UBC pediatrics assistant professor Christine Chambers, has examined ways children use everyday language to describe pain, as well as their ability to accurately convey their level of pain, through methods that include pointing to a series of pain faces developed as a rating scale, called the Faces Pain Scale Revised. The research will increase understanding of how developmental factors – such as language and numerical reasoning – influence children's ability to accurately express pain with these scales.

Ultimately the research could lead to more effective pain assessment and treatment for children.

"Kids do a lot of things when they're in pain," says Job, who completed the research at the UBC pPsychology department and the B.C. Research Institute for Children's and Women's Health. "They have characteristic facial expressions, they have characteristic body expressions. But few studies have considered how children develop vocabularies to express pain. This is a novel area in the field of pediatric pain assessment."

Results of one study that used the Child Language Data Exchange System (CHILDES) database, a large language development database found the pain word strings most frequently used by a sample of children aged 12 to 108 months were "hurt," "ouch" and "ow" while "ache", "boo-boo", "pain" and "sore" occurred very infrequently. Researchers also found that the earliest age of emergence for a pain word string ("ouch") was 17 months while the latest age of emergence for a word string ("pain") was 72 months.

In another study involving coding videotapes of 58 children aged four to six years receiving a routine immunization, 27 children used words to express the pain they experienced due to the injection; the remaining 31 did not use words. By far the most common utterance for those using words was an interjection – "ow!" Other utterances included declarative sentences ("It doesn't hurt"), exclamatory sentences ("I didn't cry!"), and interrogative sentences ("Is that done?"). Researchers found that older children were less likely to use words to express their pain.

Job says the studies reflect the need for clinicians to become informed of factors, such as language development, that impact on pediatric pain assessment. Only when clinicians carefully account for the role developmental factors play in the pain assessment process will they be best able to appropriately diagnose and treat pediatric pain. □

UNIVERSITY BOULEVARD ARCHITECTURAL COMPETITION

Seven international teams consisting of the world's leading architects have been shortlisted in a bid to create a new gateway and social heart for UBC's Vancouver campus.

In total, 52 teams from 16 countries submitted expressions of interest, including: Canada, the USA, Belgium, Italy, Denmark, Austria, Spain, India, Germany, the United Kingdom, Finland, Netherlands, Norway, Switzerland, Japan, and France.

Beginning in January, the competition's shortlist committee will interview each of the seven semi-finalists. Following this process, three finalists will be chosen and the competition will officially enter Stage 2 in which the three teams will prepare three visions for UBC's University Boulevard. These designs, informed by a campus poll, will then be evaluated by a jury which includes a roster of internationally recognised architects in association with university representatives.

the short list

The seven semi-finalist teams include:

1. Allies and Morrison Architects, London, England with Proscenium Architecture and Interiors Inc., Vancouver, B.C
2. Diamond & Schmitt Architects Inc., Toronto, Ontario with Acton Ostry Architects, Vancouver, B.C.
3. Moore Ruble Yudell Architects & Planners, Santa Monica, California with Hughes Condon Marler Architects, Vancouver, B.C.
4. Patkau Architects, Vancouver, B.C.
5. Richard Rogers Partnership, London, England with Robert Burgers, West Vancouver, B.C.
6. Vincent James Associates Architects, Minneapolis, MN with mcfarlaneGreen Architecture & Design, North Vancouver, B.C.
7. Zaha Hadid Architects, London, England with Kasian Architecture Interior Design & Planning Ltd., Vancouver, B.C

UNIVERSITY TOWN

A Sustainable Future

University Town is a mixed use and sustainable community which supports and strengthens the university's academic mission. For more information on the competition objectives, scope and schedule please visit **www.universitytown.ubc.ca**