

A ray of light for bladder research

UBC researchers have stumbled on a new, non-invasive way to diagnose urinary problems

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VANCOUVER - A serendipitous meeting of University of B.C. researchers has led to a unique, less invasive, less painful way to probe the source of problems like urinary incontinence and frequency that plague many people.

The patented infrared device does away with the need for rectal and/or urethral catheter insertion into the urinary tract to diagnose problems by measuring things like urine volume and output.

It was originally conceived by a team at B.C. Children's Hospital to measure brain oxygen levels during heart bypass surgery. But a chance encounter and discussion between three researchers from completely different fields led to a whole new role and award-winning recognition for the technology.

It uses light to measure oxygen levels in the bladder muscle blood vessels to determine if there is a constriction in the bladder due to some kind of obstruction.

The new technology is just one of the research tools to be used at the new Bladder Care Centre at UBC Hospital that officially opens today.

Lauded as the only one of its kind in the world, the centre is located in a hospital wing that had been sitting vacant. It cost \$600,000 to renovate with private donations.

In addition to serving an estimated 10,000 male and female patients a year, it will be the hub for bladder research activity. The research includes a U.S. government-sponsored \$1-million, five-year study into how cranberry juice works to prevent urinary tract infections, which are said to afflict thousands of B.C. women.

Dr. Lynn Stothers, the centre director and Vancouver urologist who co-developed the near-infrared spectrophotometry (NIRS) with Roy Gagnon and pediatrician Dr. Andrew McNab, said it will be the only centre in the world where patients can get a non-invasive examination of their bladder to diagnose bladder filling and emptying functions and blood volume changes.

The bladder wall consists of muscle fibres that contain blood vessels that unfold and refold as the bladder fills and empties. The infrared device uses miniature laser beams to send light through the abdomen. The beams are delivered through leads attached to patches placed on the skin over the bladder. One lead emits light and the other collects light.



CREDIT: Bill Keay, Vancouver Sun

New infrared technology is looked at by Dr. Andrew McNab (left), Dr. Lynn Stothers and Roy Gagnon.

Gagnon explains the method this way:

"Typically, NIRS uses several low-powered miniature lasers to send light into the patient's abdomen, while a minute detector adjacent to the emitter samples the amount of light passing through the tissue, that was not absorbed by the blood and cytochrome molecules in the bladder. By subtracting the amount of light detected from the amount of light emitted, clinicians are able to detect changes in the associated molecular activities in the bladder...."

Stothers said it is hoped that the technology will lead to a better understanding of the causes of bladder problems so doctors can do more than treat symptoms.

The NIRS device won first prize for research at the recent Northwest Urological Association meeting and in May, it will be presented at the American Urological Association meeting in Texas. The inventors are also awaiting word from the Canadian Space Agency for a grant to use NIRS in astronauts to help them understand more about bladder functions in space.

Dr. Larry Goldenberg, head of urology at Vancouver Hospital and UBC, said the centre is the realization of a goal set five years ago to establish a centre of excellence for clinical urology services, teaching and research in a multi-disciplinary environment.

"Bladder problems are so prevalent, affecting half of people over the age of 50 to some degree and 15 per cent of the overall population. They may not be life-threatening problems but people sure do suffer and in an era in which quality of life is so important, this is a crucial resource which will consolidate services provided by an integrated team of nurses, urologists, gynecologists, pharmacists and physiotherapists."

Stothers said the centre should reduce wait periods for investigations of urinary problems to about four weeks from 16.

The new facility positions the medical school, UBC and Vancouver Coastal Health Authority as "national leaders in determining the causes and prevention of bladder disorders," said Alison Buchan, associate dean of research.

THE LOWDOWN ON URINARY INCONTINENCE:

- In women, the causes can include urinary tract infections due to sexual activity or bacterial infections, and pelvic floor weakening or straining; in men, prostate problems are a common trigger. Those with spinal cord injuries also suffer from urinary incontinence.
- 60,000 residents of Vancouver and Richmond alone are estimated to have urinary incontinence or leakage; population aging will double that number within 20 years.
- It now affects 50 per cent of all long-term-care residents, 25 per cent of middle-aged women and 15 per cent of all men 60 years and older.
- Stress incontinence is leakage during laughter, sneezing, coughing or exertion; urge incontinence is an intense and too-frequent need to urinate.
- Treatments include medications, Botox injections into the bladder to affect sphincter muscles, physiotherapy exercises along with biofeedback, behavioural modification, lifestyle and dietary changes, and surgery as a last resort.