

St. Joseph's  
Healthcare  Hamilton

The Research Institute  
of St. Joe's Hamilton

# 2016 ANNUAL REPORT



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The Research Institute of St. Joe's Hamilton represents a collaborative community of researchers that strive to improve the quality of life of patients in Hamilton and around the world. With an impact that reaches deep into the local community and stretches wide around the world, our researchers are on the cutting-edge science and innovation.

Researchers affiliated with our Research Institute often form collaborative research teams that stretch across medical disciplines internally and across international borders. By working in partnership with their colleagues, our researchers form an academic and scientific community to foster a culture of exploration, innovation and inquiry at St. Joseph's Healthcare Hamilton.

Since the creation of the Research Institute in 2014, this culture has spread across our organization – inspiring administrators, nurses, learners and allied health professionals to not only take pride in research, but to help create solutions that implement new discoveries into practice.

Through this process, our organization strives to deliver the best possible care to our local community while also making a global impact through the new diagnostics, processes and treatments developed at St. Joseph's Healthcare Hamilton.

## Publication Credits

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# A WORD FROM PETER TICE

Chair, Board of Directors,  
the Research Institute of St. Joe's Hamilton



# A WORD FROM JACK GAULDIE

Scientific Director,  
the Research Institute of St. Joe's Hamilton



**The Research Institute of St. Joe's Hamilton represents some of Hamilton's best and brightest minds in health research. Through a strong partnership with McMaster University and the Michael G. DeGroot School of Medicine, our research institute fosters an atmosphere of collaboration and mentorship that leads to healthcare improvements and inspires the next generation of researchers.**

We are proud to share with you examples of how the cutting-edge research carried out at St. Joseph's Healthcare Hamilton is making an impact in our local community and beyond. By putting patients first in their scientific endeavours, our researchers are able to improve the quality of life for those we serve through innovation and discovery.

We invite you to discover the extraordinary impact that they are making.

**Through the pursuit of knowledge, research transforms the way diseases are prevented and treated. The world-class quality of research at SJHH is able to improve outcomes within our local Hamilton community, across Canada and around the world.**

Improving patients' quality of life through scientific inquiry and the translation of that evidence to influence medical practice is at the core of our mission. Moving healthcare forward is a point of great pride for our physicians, health professionals and staff as they deliver compassionate care to those who need it most.

Conducting studies in our labs, our clinics and out in our community enables our researchers to answer critical questions that help to reimagine care for the 21st century.

# SAVING LIVES BY PREVENTING RELAPSE

More than 50,000 patients in Ontario are currently taking methadone as a treatment for opioid addiction. A new study led by researchers at St. Joseph's Healthcare Hamilton has tested a tool that successfully identifies patients that have a high risk of relapsing. Identifying these patients allows clinicians to better address the problem of relapse by providing intensive treatment to patients at risk.

"In a time when the use of potent opioids such as fentanyl is on the rise, it is best that we take all precautions in clinician decision making," says Dr. Zena Samaan, researcher at St. Joseph's Healthcare Hamilton and the study's senior author. "The purpose of creating a tool to identify patients at high risk for relapse during methadone treatment is to not only prevent overdose but also to target therapies most appropriate for this patient population."

The tool itself is a questionnaire that has been created by partnership between McMaster University's Population Genomics program and the Canadian Addiction Treatment Centres (CATC). It analyses the addiction severity as well as patients' treatment response to methadone.

Designed specifically for patients on methadone maintenance treatment, the questionnaire also accurately predicts patients' illicit drug use for up to three months.

The latest Canadian Tobacco, Alcohol and Drugs Survey taken in 2013 found that 2% of Canadians reportedly abused opioids. Data from the Office of the Chief Coroner for Ontario show that fentanyl has now become the leading cause of opioid deaths in Ontario.

"Identifying patients at high risk for relapse will serve as a strategy for treatment tailoring, relapse prevention, and altogether improving our understanding of managing opioid dependence," says Dr. Brittany Dennis, a research affiliate at the Peter Boris Centre for Addictions Research at St. Joseph's Healthcare Hamilton and the study's first author.



## MENTAL HEALTH + ADDICTION RESEARCH IN NUMBERS

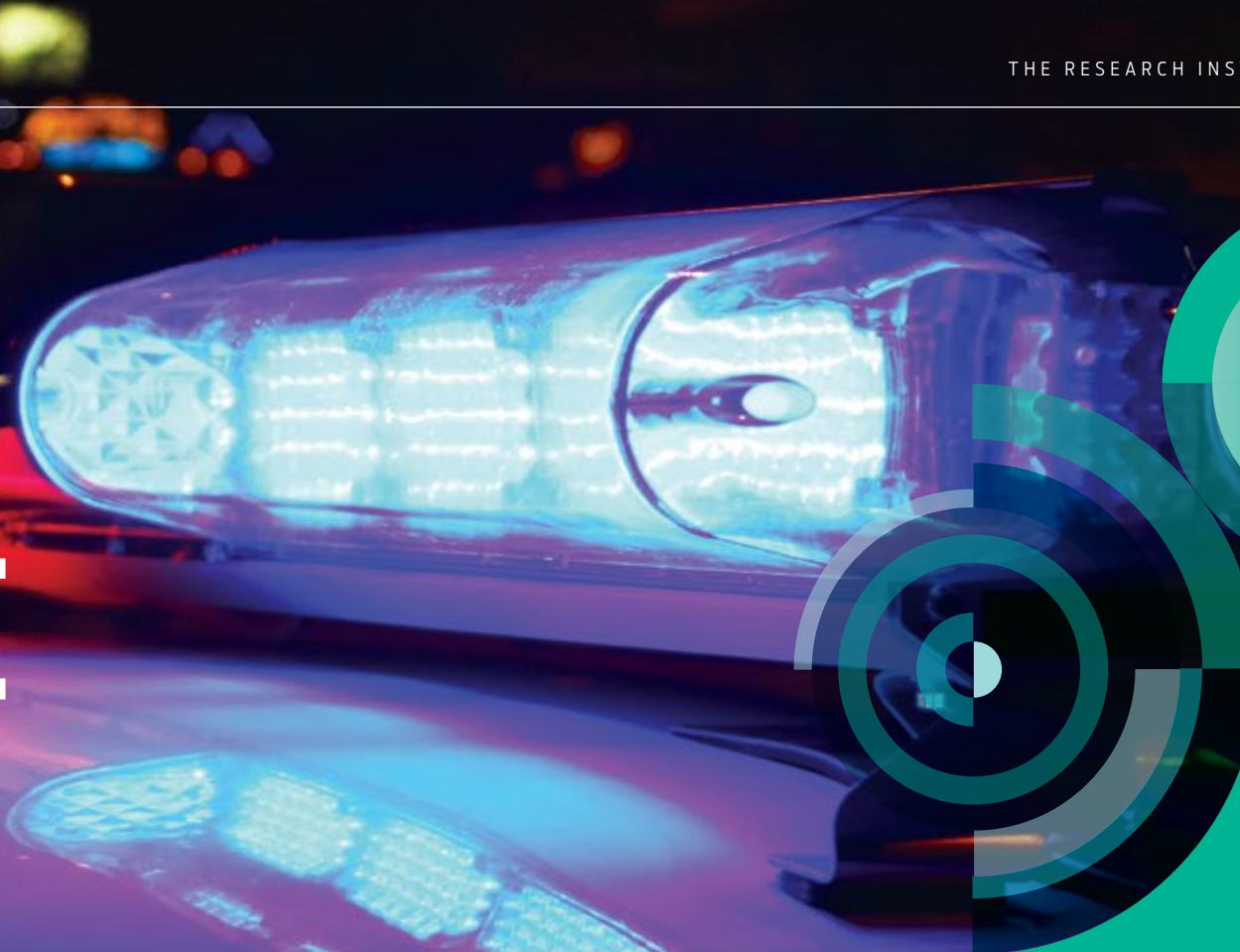
### RESEARCHERS



### PUBLICATIONS



# CRISIS RESPONSE TEAM SUCCESSFULLY PAIRS CLINICIANS WITH POLICE



“As a health leader who is interested in quality improvement, research is a critical component of properly leading thoughtful enquiry into how best to make, sustain and spread change.”

Jodi Younger

**Hamilton's Mobile Crisis Rapid Response Team (MCRRT) is the only mental health crisis response team in Canada that pairs a mental health professional with law enforcement officers as first responders.**

A new study conducted by researchers at St. Joseph's Healthcare Hamilton has found that the Hamilton Mobile Crisis Rapid Response Team (MCRRT) has succeeded in its aims to improve immediate care for those experiencing mental health crises, reducing the amount of emergency department visits among such patients by 52%.

“The goal of the MCRRT is to reduce the number of people diagnosed with mental illness that are unnecessarily admitted to the emergency department – diverting them instead to crisis beds, urgent services or community resources – where they can get the care that they need” states Jodi Younger, Clinical Director, General Psychiatry & Addiction Services at St. Joseph's Healthcare Hamilton and principal investigator of the study. “These findings prove that the program is successful at attaining and exceeding its goals – even beyond our expectations.”

The program effectively improves care by ensuring that patients experiencing crises are given targeted treatment that fits their needs, while the emergency department becomes more accessible to the patients that need it most.

The study also demonstrated that the implementation of the MCRRT reduced the proportion of patients taken into the hospital and were discharged without an assessment by a psychiatrist to 20%, compared to the prior rate of 53%. The average wait times of police officers in the emergency department were also consistently shorter than those prior to the program's implementation.

“A strong collaboration between mental health professionals at St. Joseph's Healthcare Hamilton and law enforcement officers at Hamilton Police Service makes this program work,” says Ms. Younger.

The success of this program has led to the expansion of the program across the Hamilton-Niagara-Haldimand-Brant LHIN. The model received a “best abstract” award at the 2016 Health Quality Ontario annual conference and was also inducted to the Minister of Health's Honour Roll for Quality Improvement.



# FIGHTING IPF FROM BENCH TO BEDSIDE



**Idiopathic pulmonary fibrosis (IPF) is a type of lung disease that has a higher mortality rate than cancer. The disease results in irreversible lung scarring that makes it difficult for patients to breathe properly. It is estimated that between 10,000-12,000 Canadians are diagnosed with IPF, and half of these patients will only live with the disease for an average of three to four years. Currently, the disease has no known cure.**

Researchers at St. Joseph's Healthcare Hamilton have led both laboratory studies and clinical trials to improve care for patients with this disease.

In the labs, scientists have made key discoveries that help explain how the disease progresses. By using models of lungs, they have discovered that the stretching of the lungs through breathing activates cellular processes that cause the disease to progress.

Another research group has found that the loss of a protein called Grp78 was associated with the death of certain cells involved in the scarring process itself.

"Trying to identify the factors involved in the progression of a devastating disease such as IPF is a difficult process," says Dr. Kjetil Ask, researcher at St. Joseph's Healthcare Hamilton and the study's senior author. "Once we get a better handle on the biochemical and cellular processes involved in scarring mechanisms of the lung, we are one step closer in terms of finding potential new treatment strategies that may improve the lives of IPF patients."

Clinically, our researchers have led international trials that have proven the effectiveness of two new drugs in slowing down the progression of IPF by up to 50%.

One of the drugs has now become available for Canadians and is covered by the Ontario Drug Benefit Program, while the other is currently undergoing approval.

By working to prove the safety and effectiveness of new treatments, our researchers offer the hope of a longer life for those diagnosed with IPF.

"What our researchers at St. Joseph's Healthcare are doing is a prime example of translational science," says Dr. Martin Kolb, Research Director of the Firestone Clinic at St. Joseph's Healthcare Hamilton. "We are testing compounds at the laboratory bench, are helping to move them to clinical trials and now are able to provide cutting edge treatments for our patients."



LUNGS + CHEST  
RESEARCH IN NUMBERS

## RESEARCHERS

26

## PUBLICATIONS

72



# HEALTHCARE THAT PUTS PATIENTS FIRST

The Integrated Comprehensive Care program has pioneered a new, integrated model of patient care. By bridging hospital and home together with community service centres, the ICC program provides continuous care that stretches across each step of the patients' journey. The patient is accompanied by the same care team at each point of care for a truly holistic experience.

The program has been implemented across the HNHB (Hamilton Niagara Haldimand Brant) LHIN for patients that require hip or knee replacement surgery, chest surgery and treatment or those who have chronic heart or lung conditions.

For patients experiencing lung cancer, for example, research led by thoracic surgeons, evaluative researchers and hospital management at St. Joseph's Healthcare Hamilton and the St. Joseph's Health System has demonstrated the success of the program in providing improved post-discharge care for patients receiving major chest surgery. A total of 686 patients from St. Joseph's Healthcare Hamilton were enrolled in the study.

When compared with a control group, patients enrolled in the ICC program experienced shorter hospital stays, fewer readmissions and ER visits, and no increase in adverse post-discharge outcomes. The cost-per-patient was also lower for patients enrolled in this program.

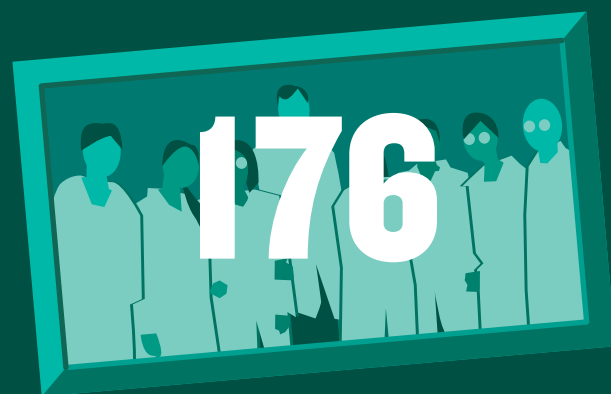
Hospital readmissions and ER visits for discharged patients after surgery is associated with higher mortality rates. Reducing this outcome therefore improves patient outcomes by lowering the risk of complications and death.

The success of the ICC program in this domain and others has been recognized internationally. The program has received a Canadian leadership award for innovation in improving outcomes. The Province of Ontario is adopting the program to other centres across the province.

"The structure of patient care is truly evolving," said Dr. Kevin Smith, CEO, St. Joseph's Health System. "This will eradicate silos and ensure that the system can wrap holistic care around the patients as well as the providers, building confidence in care along the way."



## TOTAL # OF RESEARCHERS



## TOTAL PUBLICATIONS



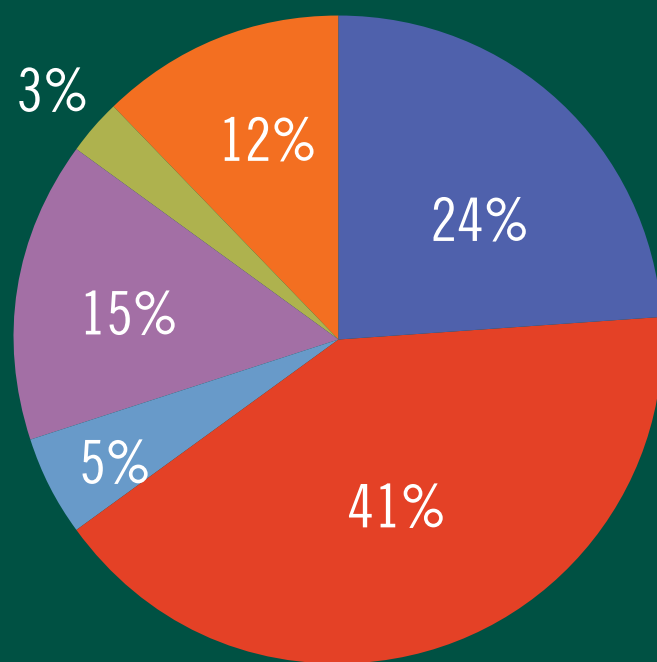
## TOTAL FUNDING

\$26,084,302

## FUNDING SOURCES BY %

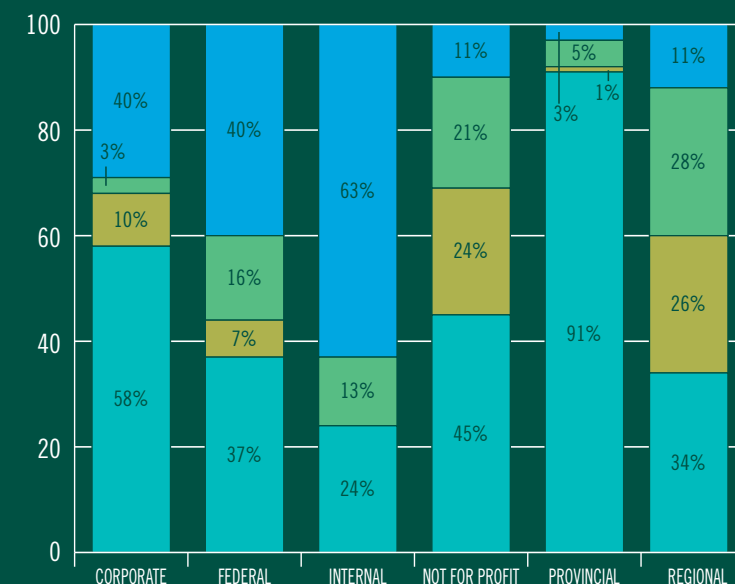


- CORPORATE
- FEDERAL
- INTERNAL
- NOT FOR PROFIT
- PROVINCIAL
- REGIONAL



## EACH PROGRAM BY FUNDING SOURCE BY %

- FSORC
- K&U
- MH&A
- L&C



	CORPORATE	FEDERAL	INTERNAL	NOT FOR PROFIT	PROVINCIAL	REGIONAL
FSORC	58%	37%	24%	45%	91%	34%
K&U	10%	7%	0%	24%	1%	26%
MH&A	3%	16%	13%	21%	5%	28%
L&C	30%	40%	63%	11%	3%	11%

## RESEARCH FUNDING PER PI PER PROGRAM 2015/16

FSORC \$152,212

K&U \$147,258

MH&A \$145,474

L&C \$297,467

## PEER REVIEWED FUNDING

Peer Reviewed  
**59%**



Not Peer Reviewed  
**41%**



# TREATING RHEUMATOID ARTHRITIS FASTER



Through the use of new imaging techniques, researchers at St. Joseph's Healthcare Hamilton have discovered new ways to measure bone and joint erosion in patients with rheumatoid arthritis. This early identification of erosion allows clinicians to treat this disease faster and more accurately than before.

Rheumatoid arthritis is an autoimmune disease that causes joint inflammation. The disease results in stiffness, pain and immobility in patients' fingers, wrists, feet and ankles. Statistics Canada estimates that approximately 350,000 Canadians are affected by the disease.

Previously, rheumatologists used x-rays measure the progression of the disease. Dr. Jonathan Adachi and his colleagues have developed new MRI imaging techniques that use computer algorithms developed by researchers across Hamilton.

This new type of imaging allows clinicians to better see and quantitate the size and progression of erosions caused by rheumatoid arthritis in patients' hands. St. Joseph's Healthcare Hamilton is one of only a few sites in the world that has these capabilities.

"This ability allows us to see the damage that has been done to joints and to determine whether our therapies are preventing and even reversing this damage," says Dr. Jonathan Adachi, rheumatologist at St. Joseph's Healthcare Hamilton and the study's senior author.

Rheumatoid arthritis is difficult to diagnose. In the early stages, it can appear similar to other types of arthritis. A fast and accurate diagnosis in the early stages of the disease means that clinicians can treat the disease aggressively with biologics and thus slow down and even reverse the progression of the disease and lead to improved patient outcomes.

"With imaging guided early aggressive treatment, we hope to be able to treat the right patient with the right drug leading to disease-free remission," says Dr. Adachi.



## FSORC RESEARCH IN NUMBERS

### RESEARCHERS



### PUBLICATIONS



# THE WORLD'S FIRST VACCINE AGAINST CHLAMYDIA



“My work on infectious diseases began with seminal work leading to the development of vaccines against the rabies virus, SARS coronavirus and – more recently – chlamydia. I have been fortunate over the years to work with wonderful colleagues here at St. Joe's, at McMaster University, and indeed around the world — which has turned into lasting friendships on several continents.”

Dr. Mahony

Researchers at St. Joseph's Healthcare Hamilton and McMaster University have taken the first steps towards a widely protective vaccine against chlamydia.

Chlamydia is one of the most common sexually transmitted infections and affects 113 million people around the world. The disease causes pelvic pain in women, leads to other infections, and can cause irreversible damage resulting in infertility. As many chlamydia infections are asymptomatic, they can go untreated and cause damage without the patient being aware of the infection.

While chlamydia is currently treated with antibiotics, a vaccine would prevent the infection from occurring in the first place. This could potentially protect millions of people from chlamydia.

The research team successfully tested a new recombinant antigen called BD584 in animal models with a common strain of chlamydia. The vaccine was delivered into the nose and protected the mice from genital tract infection as well as its damaging symptoms.

“The BD584 vaccine candidate is a fusion protein consisting of three genetically engineered proteins fused together,” says Dr. James Mahony, virologist at St. Joseph's Healthcare Hamilton and the study's senior author. “The vaccine elicits the production of antibodies that can block an essential virulence factor of chlamydia required for infection of cells therefore rendering the bacteria incapable of infection.”

The study showed that BD584 reduces chlamydial replication and shedding in the lower genital tract by 95 per cent, which is what enables the bacteria to spread to the upper genital tract. The vaccine also decreased pathology of the fallopian tubes by 87.5%. Dr. Mahony explained that chlamydial infection of the upper genital tract leads to fluid filled fallopian tubes that block fertilization of eggs.

“The advantage of our vaccine is that it provides protection against all strains of Chlamydia that infect the genital tract. It is the first vaccine to provide this wide scale coverage,” says Dr. Mahony. “It will also protect against those strains of Chlamydia trachomatis that cause conjunctivitis in the eye leading to scarring trachoma and blindness which affects 6-9 million people around the world.”

Dr. Mahony notes that future research on other animal models will need to be done before the vaccine is tested in human trials. Further research will also test the effectiveness of this vaccine against different strains of chlamydia.



# A NEW WAY TO IMPROVE CHRONIC KIDNEY DISEASE CARE



## KIDNEY + URINARY RESEARCH IN NUMBERS

### RESEARCHERS



### PUBLICATIONS



Chronic kidney disease is defined by kidney damage that generally results in a loss of kidney function. Scientists estimate that approximately a quarter of people over the age of 64 develop chronic kidney disease.

For some patients, this disease will eventually progress to end-stage kidney disease – where they will have to undergo dialysis or receive a kidney transplant in order to survive.

Patients with end stage kidney disease that need dialysis have an increased risk of serious bleeding. Serious bleeding can lead to shock or even death.

A new study led by Dr. Amber Molnar has uncovered two risk factors that are linked with major bleeding in patients with chronic kidney disease – the severity of the loss in kidney function and the amount of protein found in urine are both factors that predict the patients' risk of bleeding.

The research team analyzed database records of patients across Ontario who met the study criteria to develop their findings.

“Our study found that the risk of bleeding increased in a graded fashion as kidney function declined and protein in the urine increased,” says Dr. Amber Molnar, nephrologist at St. Joseph’s Healthcare Hamilton and the study’s first author. “Measuring kidney function and urinary protein can help clinicians determine bleeding risk in these patients.”

In particular, urinary protein, which can be reduced and treated, could serve as a new therapeutic target for preventing bleeding events in patients with chronic kidney disease. Further research is required to validate this theory.

By working to anticipate and prevent disease complications, researchers at St. Joseph’s Healthcare Hamilton are helping to improve the quality of care provided to patients.



# IMPROVING DIAGNOSTICS FOR PROSTATE CANCER



“ The high prevalence of prostate cancer demands broad-based research in order to achieve enhanced survival and quality of life for those impacted by this disease. ”

Dr. Shayegan

Prostate cancer can be diagnosed in a number of ways. From physical examinations to antigen blood tests, diagnostics for prostate cancer are the first step to effective treatment. But certain forms of prostate cancer are harder to diagnose than others.

Anterior prostate cancer is a type of prostate cancer that occurs in the anterior lobe of the prostate. It can be difficult to diagnose accurately as this part of the prostate cannot be examined without invasive methods.

A pilot study conducted by St. Joseph's Healthcare Hamilton researchers has found a new way to diagnose this form of prostate cancer more accurately than currently-used methods. The new technique involves taking a transurethral biopsy and examining the sample using a multi-parametric MRI.

In the patients studied, the researchers found that 81.8% of the patients who had a negative diagnosis using transrectal ultrasound-guided biopsies had clinically significant tumours that were successfully diagnosed through the new technique.

The pilot study performed serves as a proof of concept for further research on this new diagnostic technique. If this technique is further validated, it may become one of the standard approaches for patients that fit the diagnostic criteria.

The earlier clinicians can accurately identify cancerous tumours, the more effective the potential treatment can be. Studies such as this can form the basis for cutting-edge diagnostic methods that have the potential of saving lives in the future.



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