



Queen's
UNIVERSITY

ANATOMICAL PATHOLOGY

Department of
Pathology and
Molecular Medicine



Welcome

The Department of Pathology and Molecular Medicine at Queen's University has a long history of training outstanding Anatomical Pathologists. Fully accredited by the Royal College of Physicians and Surgeons of Canada, the Anatomical Pathology residency program offers comprehensive training in the study of the morphologic aspects of disease.

Residents who choose to come to Queen's will find themselves welcomed into a friendly and supportive environment where they are regarded as highly valued members of our team. Our smaller size ensures that faculty are able to get to know each resident well and offer continuous guidance, support, and one-on-one teaching opportunities.

Our research activities are almost unparalleled in Canada for a department of our size. With over \$10 million in annual operating grants, world-class faculty are engaged in nationally-respected, ground breaking research. Residents are strongly supported in their own research endeavours and are able to devote up to a year of their training to research.

Graduates of our program are prepared for a wide range of rewarding careers as independent consultants and academic physicians. Many of our residents have also gone on to complete prestigious Fellowships, both in Canada and abroad.

We are proud to offer one of Canada's leading programs in Anatomical Pathology. It is a rigorous yet highly rewarding experience and I hope you will take the opportunity to learn more. I look forward to meeting you in the future.

Christopher Davidson, MD, FRCPC
Program Director, Anatomical Pathology

Program Structure

The five-year Anatomical Pathology curriculum is offered over 65 four-week blocks. Embracing a competency-based philosophy, training is organized into four distinct stages: Transition to Discipline, Foundations of Discipline, Core of Discipline and Transition to Practice within which residents develop entrustable competence in specific professional activities. Surgical pathology training is organized into **organ-based subspecialty rotations**. This is a real strength as residents can focus on attaining mastery of the gross and microscopic pathology of one organ system at a time allowing for the rapid acquisition of competence in that area.

Residents work directly with sub-specialist faculty members allowing for high-quality, daily face-to-face teaching. As residents progress through the program they are afforded **progressively greater responsibility** and by the completion of the program are ready to function as independent junior consultants.

Residents have the opportunity to complete off-site elective rotations to pursue individual interests/ learning goals and to explore fellowship/work possibilities. Also, for interested residents, research electives can be completed.

CBME Stages of Residency			
TRANSITION TO DISCIPLINE	FOUNDATIONS OF DISCIPLINE	CORE OF DISCIPLINE	TRANSITION TO PRACTICE
			
1 Block (proposed) JUNIOR RESIDENT Concentration on orientation	11 Blocks (proposed) JUNIOR RESIDENT Focuses on experiences and basic skills in clinical medicine and Anatomical Pathology required to move on to more advanced specialty-specific competencies	30-36 Blocks (proposed) SENIOR RESIDENT Training concentrates on the core competencies required for the discipline	10-14 Blocks (proposed) JUNIOR ATTENDING The final phase of training. Residents develop their ability to transition to autonomous practice
		Proposed RCPC Exam	Current RCPC Exam





Academic Curriculum

In addition to the daily face-to-face learning that occurs on each rotation, the program provides a comprehensive academic curriculum that is centered around the academic half-day, but that also involves numerous other rounds throughout the week. A thematic curriculum is organized on a two-year cycle such that **residents are exposed to each subject twice in this venue over the course of their residency**. Protected time is provided for teaching rounds to allow residents to maximally participate.

As residents approach their Royal College examinations, the program also provides funding for participation in a Canadian review course.

Rounds and Conferences

Sample Weekly Schedule

MONDAY

8:30–9:30 Autopsy Conference
1:00–2:00 Hematopathology Review

TUESDAY

8:30–9:30 Neuropathology Conference
2:00–3:00 GI and Liver Conference

WEDNESDAY

8:00–8:55 Resident Led Session
9:00–9:55 AP Seminar
10:00–10:55 Micro Round
11:00–11:55 Journal Club
12:00–1:00 Genetic Mini Series

THURSDAY

11:30–12:30 Grand Round
4:00–5:00 STB Round up/Liver Biopsy Round/
Renal Biopsy Round

FRIDAY

9:00–9:30 Gross Rounds
12:00–1:00 Forensic Mini Series/Cardiovascular
Pathology Mini Series
1:30–2:30 Medical Legal Work Round
1:30–2:30 Hematology Morphology Round

Research

A resident research director helps match resident interest with research opportunities. Research success is celebrated at an annual off-site departmental resident research day with an invited guest speaker. The program offers generous annual financial support for residents to present their work at national and international meetings.

Residents interested in academic careers benefit from research electives for in-depth research. For residents interested in completing a graduate degree while a resident there is a clinical investigator program. Residents are supported in applying for independent funding and scholarships, should they wish to, and recently have met with much success in doing so.

With over \$10 million in annual operating grants, the Department of Pathology and Molecular Medicine at Queen's is one of Canada's leading pathology research centres. Residents are able to work in established laboratories, which use multidisciplinary techniques to investigate fields such as cancer biology, vascular biology, genetics, molecular hemostasis, amyloidogenesis, and cholesterol metabolism.

Faculty and residents are also able to collaborate with the Queen's Cancer Research Institute, a nationally respected transdisciplinary facility offering 60,000 square feet of dedicated research space. Translational research has emerged as another strength of the Department through this collaboration.

Background

Epithelial cell adhesion molecule (EpCAM) is a transmembrane glycoprotein involved in cell adhesion, signaling, migration, proliferation and differentiation. It is known to be expressed in normal epithelium and epithelial neoplasms. Altered EpCAM expression correlates with aggressive biological behavior in gastric, breast, renal and thyroid carcinomas. Recent studies have proposed the proteolytic cleavage of the intracellular domain of EpCAM (EpCAM-ICD) triggers a signalling cascade leading to the activation of the Wnt/ β -catenin pathway and aggressive tumour behavior.

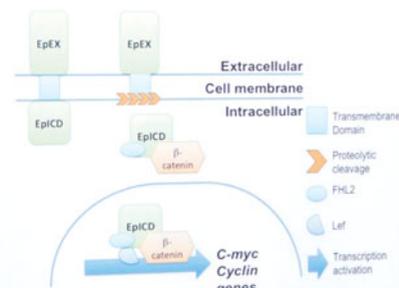


Figure 1. Proteolytic cleavage of EpCAM and the proposed EpCAM-ICD signaling pathway.¹ Cleaved EpCAM-ICD binds to adaptor protein FHL2 and beta-catenin in the cytoplasm, which translocates to the nucleus, binds to Lef and upregulates c-myc and cyclin genes transcription, leading to tumorigenesis and progression.

Objectives

1. To elucidate the expression profile of EpCAM in primary colorectal adenocarcinoma.
2. To assess EpCAM's role as a prognostic marker.

Membranous Expression of EpCAM-ICD Correlates with Poor Patient Outcome in Primary Colorectal Adenocarcinoma

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Methods

EpCAM-ICD immunohistochemical expression was assessed in 150 primary colorectal adenocarcinoma patients treated in our institution between 2007 and 2012. The presence and intensity of EpCAM-ICD membranous staining was assessed by 3 pathologists. Patient characteristics were determined for a wide range of clinical parameters and correlated with the outcome by the Pearson correlation coefficient, U-tests and two-tailed T-test.

Results

EpCAM-ICD expression levels were positively associated with low preoperative serum carcinoembryonic antigen, and 5 year survival. The presence of perineural invasion and macroperforation are associated with lower EpCAM-ICD staining scores, but small sample numbers have precluded these results from reaching statistical significance. The correlation of the loss of EpCAM-ICD membrane staining with poor prognostic factors, in the context of the Wnt signaling pathway by which it is proposed that cellular proliferation leads to cellular

Discussion

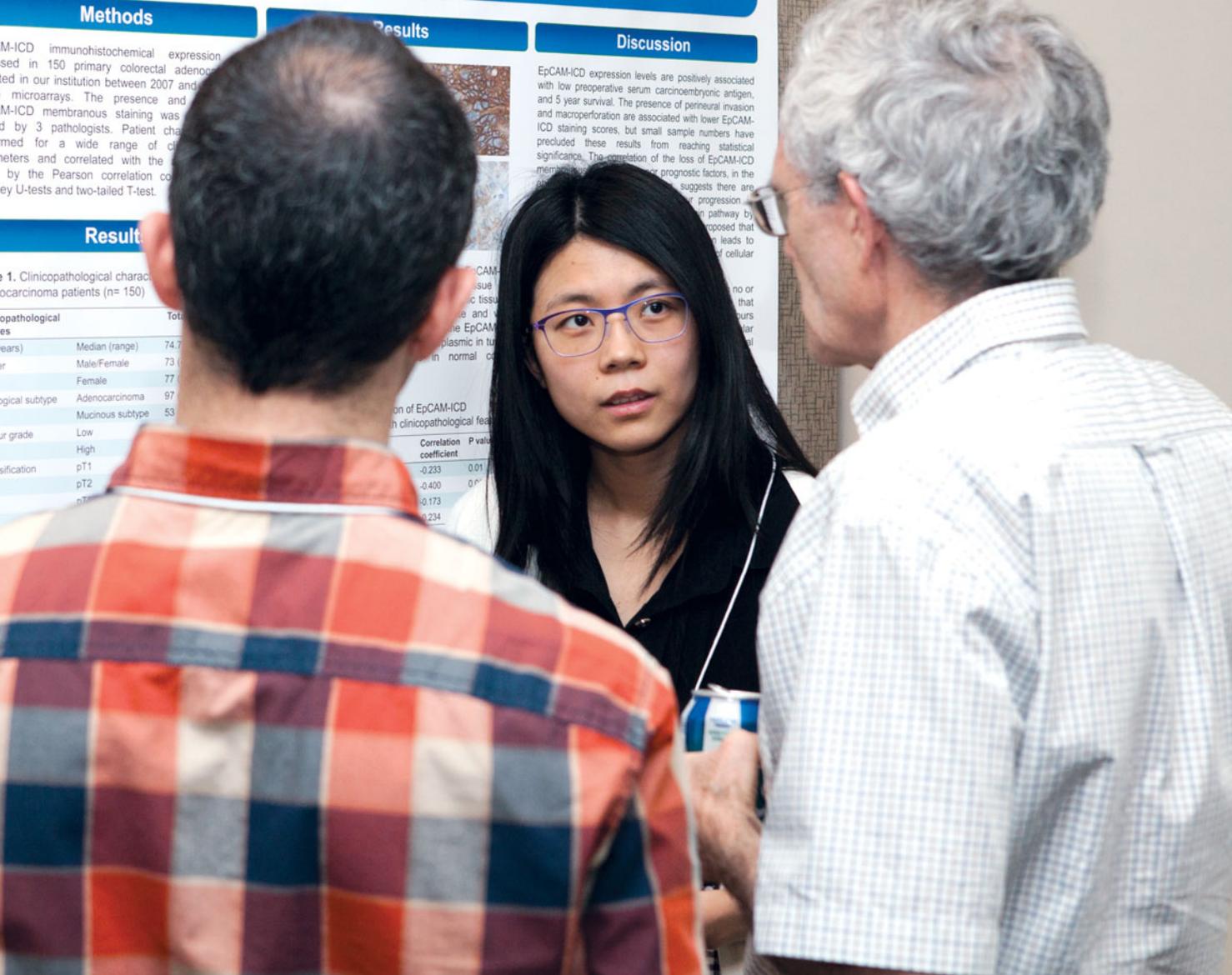
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Results

Table 1. Clinicopathological characteristics of colorectal adenocarcinoma patients (n= 150)

Clinicopathological characteristics	Total (n)
Median (range) (years)	74.7 (60-85)
Sex	
Male/Female	73 (48.7%) / 77 (51.3%)
Pathological subtype	
Adenocarcinoma	97 (64.7%)
Mucinous subtype	53 (35.3%)
Stage	
Low	100 (66.7%)
High	50 (33.3%)
Classification	
pT1	10 (6.7%)
pT2	70 (46.7%)
pT3	50 (33.3%)
pT4	20 (13.3%)

Correlation of EpCAM-ICD expression with clinicopathological features	Correlation coefficient	P value
CEA	-0.233	0.01
Perineural invasion	-0.400	0.001
Macroperforation	-0.173	0.001
EpCAM-ICD membrane staining	0.234	0.001



Hospitals and Facilities

Anatomical Pathology is based at Kingston Health Sciences Centre – Kingston General Hospital (KGH) Site, southeastern Ontario's leading centre for complex-acute and specialty care. KGH is also home to the Cancer Centre of Southeastern Ontario, allowing for a wide range of oncology-related pathology. The hospital serves almost 500,000 people and the large consultative service for pathology ensures an excellent mix of case material and numbers to provide good volume for residents. KGH was ranked in 2011 as one of Canada's Top 40 Research Hospitals by Research Infosource.

KGH is a regional forensic centre, ensuring that residents are exposed to a wide breadth of autopsy cases. The autopsy suite at KGH can accommodate the performance of two concurrent autopsies and full technical support is available at all times. The suite contains state-of-the-art equipment for gross photography, including a stereoscope and a post-mortem x-ray suite. Residents have access to photomicroscopes with immunofluorescence capability, a faxitron for radiological examination of specimens, and a rapidly expanding archive of digital gross and microscopic images.

Surgical pathology facilities include a large and well-equipped histopathology laboratory housing a grossing area, frozen section area, histopathology bench space (including special stains and immunohistochemistry sections) and a cytology wet lab. This allows for optimal interactions between diverse aspects of the laboratory. Surgical pathology is fully supported by a DNA diagnostics service including gene and tissue microarrays, a cytogenetics laboratory, a flow cytometry laboratory, broad immunohistochemistry capability, and electron microscopy.

Learning Environment

One of the key strengths of the Anatomical Pathology program at Queen's is its smaller size. New learners are warmly welcomed into a collegial and friendly environment, which fosters a close and supportive relationship between faculty and residents. The size of the program ensures **daily one-on-one teaching** opportunities, and faculty are able to offer frequent formal and informal feedback.

Careers

The program offers excellent training for residents interested in pursuing careers in either community hospital-based, academic, or forensic pathology.

Queen's residents have also met with great success in obtaining premiere Fellowship positions with field-leaders at institutions across North America including Harvard (Brigham and Women's, Beth Israel Deaconess, Massachusetts General), Yale, Mayo Clinic, Cornell and Memorial Sloan Kettering.

Why Anatomical Pathology at Queen's?

Size

The smaller size of the program has created an outstanding atmosphere for residents. The work environment is collegial and supportive, and a good ratio of pathologists to residents allows for daily one-on-one teaching opportunities.

Research

Broad research opportunities are strongly supported by the Department. Electives may be devoted to research.

Facilities

Residents directly benefit from state-of-the-art clinical and research facilities in the Department and at KGH.

Academic Curriculum

An abundance of educational rounds and a comprehensive curriculum on a two-year cycle with protected time to allow resident participation.

Cases

There is an excellent mix and volume of case material, providing residents with broad exposure to different fields of pathology.



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