

# REWARDS *of* RESEARCH

**What has the Companion Animal Health Fund accomplished in 25 years? Besides purchasing thousands of dollars worth of specialized equipment, the Fund has supported scientific investigations that have improved the quality of companion animal health care around the world. The Fund has been especially influential in the following research areas . . . read on to learn how your donations have brought better health to your best friends.**



## **Immunohistochemistry**

When WCVN's veterinary pathologists began exploring *immunohistochemistry* (IHC) as a diagnostic tool in the late 1980s, it wasn't long before the Companion Animal Health Fund got involved as well.

In this application, scientists use enzyme-flagged antibodies to identify patterns of antigen distribution in tissue. If the antibodies bind to the antigens, its enzymes will convert a colourless *substrate* (base) into a visible stain on a microscopic slide.

After WCVN researchers developed their first IHC technique for diagnosing an autoimmune skin disease in animals, they modified human antibody "markers" for cancerous tumour antigens into veterinary diagnostic tools. But before pathologists could use these markers, researchers had to test the human antibody markers on normal and cancerous tissue samples taken from animals.

"The Fund's support allowed graduate students to do much of this work," explains Dr. Debbie Haines, an immunopathologist and leader of the original IHC research team. "It was an opportunity for students to come in, learn the IHC technique, learn how to apply it, validate different markers and then publish their work."

Several institutions now specialize in antibody markers for companion animal diseases, "but we did some of the earliest work in applying these techniques in small animals and getting immuno stains that could be used for routine diagnostics. Many of the earliest publications were ours," says Haines, who's particularly proud of a WCVN-produced melanoma stain that graced the cover of *Veterinary Pathology* in 1994.

Based on WCVN's research, veterinary diagnostic laboratories gained access to new IHC markers that improved cancer diagnoses in companion animals. Much of that work would still be at the proposal stage if WCVN researchers had been forced to look for funding elsewhere, says Haines.

"Without the Fund, there would have been no possibility of developing these stains for small animals. It's really been the only funding source for that kind of work."

## **Molecular technology**

Fifteen years ago, Dr. Marion Jackson entered new territory in veterinary medicine when WCVN purchased its first *polymerase chain reaction* (PCR) instrument and she began using DNA testing to investigate *feline leukemia virus* (FeLV).

"At the time, no one had done molecular studies of FeLV in natural cases. Being here at the veterinary college, we could access clinical case material that dated back years. Those cases were of tremendous value to our investigation," explains Jackson, who received grants from the Companion Animal Health Fund and the Animal Health Trust of Canada for her PhD research.

Before DNA testing, veterinary pathologists only had antigen-based tests available for FeLV diagnosis. But some cats tested negative even when they had disease that clinicians strongly suspected was FeLV-related.

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Left to right: Lab technician Brenda Trask with Drs. Beverly Kidney, Marion Jackson and Kate Kewish of WCVN's Veterinary Pathology department. Top right: Kewish's graduate work focused on making WCVN's PCR assay for feline infectious anemia even more precise. Bottom right: DNA samples await PCR testing.



Those unusual cases prompted Jackson and her colleagues to investigate the possibility that FeLV could sometimes cause disease simply by integrating into the host's DNA without self-replicating. PCR testing and immunohistochemistry confirmed this theory, and those results helped veterinarians develop more accurate diagnoses and prognoses in this subset of FeLV-infected cats.

The project also gave Jackson credibility with other research grant agencies. "The Companion Animal Health Fund helped me establish a 'track record' in applying PCR technology," says Jackson. She obtained provincial and international grants totalling more than \$140,000 to investigate a possible viral link to the development of *vaccine-associated feline sarcomas* (VAFS). Jackson,

along with Drs. Debbie Haines, Beverly Kidney and John Ellis, received half of this money from the U.S.-based VAFS Task Force.

Although WCVM researchers found no link between VAFS and any of the suspected viruses, "it was necessary to carry out this work that had to be done before the VAFS research group could move on and look at other areas," explains Jackson.

Another valuable outcome of the VAFS-related work: the detection of mutated *p53*, an abnormal protein found in injection-site sarcomas. Graduate student Dr. Prashant Nambiar developed a stain for p53 that pathologists and surgeons now use to detect abnormal cells left at surgical sites.

### Reconstructive surgery

WCVM researchers created new techniques for microvascular reconstructive surgery — thanks to the support of western Canadian pet owners. "I think the Companion Animal Health Fund had a significant impact in this area. I certainly couldn't have done as much research as I have without the Fund," says Dr. David Fowler.

In the late 1980s, the surgical specialist and his graduate students began investigating options for harvesting skin flaps from other parts of a patient's body, then using the flaps to repair large wounds caused by trauma or tumour removal.

"Microvascular reconstructive surgery is cost-effective because you can do a lot of reconstructive work in a fairly short period of time. It's also one large operation rather than five- or six-stage surgeries, so the animals leave the hospital sooner and you can rehabilitate them more quickly," explains Fowler, who was on WCVM's faculty from 1984 to 2002.

As part of the repair work, surgeons use an operating microscope to reattach the skin flaps' blood supply. Researchers initially used the College's old operating microscope to conduct their work, but in the early 1990s, WCVM purchased new equipment with partial funding from CAHF.

Altogether, WCVM researchers developed more than a half-dozen skin flap options for reconstructive surgery and successfully used these techniques on clinical cases at WCVM's Veterinary Teaching Hospital. Based on their work, surgical specialists now have a viable alternative to amputating a pet's limb after an accident or tumour removal.

"Only three universities have published much in this area, and I think the University of Saskatchewan has published most of the articles. At least half of the veterinary literature dealing with microvascular reconstructive surgery was completely or partially supported by the Fund," says Fowler.

### Medical imaging

The first project CAHF ever supported was a radiographic study of Canadian Eskimo dogs that took place during the winter of 1978 in Yellowknife,

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**CANINE ORGANIZER:** Eric W. McDonald helped to organize several dog clubs and their respective all breed shows in Calgary and Edmonton. He also played a major role in establishing Dog Fanciers in Alberta. As one friend described McDonald, "... he truly was a walking encyclopedia of Dogdom." In 1980, when McDonald passed away at the age of 72, many of the people and clubs he had helped during his lifetime paid tribute to this special man. Altogether, his friends gave a memorial gift of \$3,810.96 to CAHF in McDonald's name.

**THE "SWEATER LADY":** Lynne Fedun gets her knitting needles out whenever she wants to support the Fund. In the past decade, the grandmother and pet owner from Marysville, B.C., has donated more than a half-dozen hand-knit, adult-sized ski sweaters to WCVM. Each time a bulky package arrives from Fedun, members of the College's student association organize a raffle and sell tickets on Fedun's handiwork. The students donate all proceeds to CAHF. "It's my little way of trying to help out some animals in trouble, because I've always felt that animals need my help more than people do," says Fedun.



NWT. The Fund paid \$302, sharing travel and study costs with the Eskimo Dog Research Foundation.

"A man named Bill Carpenter was reestablishing the Canadian Eskimo dog — a breed that was nearly extinct some years earlier. He wanted to avoid the problem of hip dysplasia, so he asked us to screen his colony of more than 50 dogs that he had in Yellowknife," explains Dr. John Pharr, a medical imaging specialist at WCVM and one of the Fund's longtime organizers.

Since Carpenter's dogs were semi-feral, Pharr and Valorie Beaugard, an anesthesiology technologist, used a long extension cord to set up their X-ray machine in the frosty outdoors. "We brought each dog out, sedated it and took the radiographs. I developed all of the films myself, then brought them back to WCVM for evaluation," says Pharr, who returned to Yellowknife a year later to screen the dogs' offspring.

Screening for hip dysplasia is routine, but the project's setting and circumstances were extraordinary: Pharr and Beaugard had the unique chance to evaluate a small group of animals that became the foundation stock for a reestablished breed. The Canadian Kennel Club recognized the Canadian Eskimo dog a few years after the study.

**Top:** Former CAHF Research Fellow Dr. David Fowler (right) works alongside a surgical resident on WCVM's operating microscope.

Since that first project, Pharr has collaborated on dozens of CAHF-supported projects where researchers have used medical imaging to confirm diagnoses and pinpoint the location of injured tissues or bones. But because of clinical and teaching demands, WCVM's medical imaging specialists had little time for research.

That situation improved in the mid-1990s when Dr. Rachel St. Vincent became WCVM's first medical imaging resident. Her study on transesophageal ultrasonography received financial support from CAHF, and it also caught the attention of Hewlett-Packard, the multinational technology giant. Hewlett-Packard Canada loaned WCVM a new ultrasound machine and probes — equipment valued at \$180,000 — for two years.

"CAHF research grants are usually small, but having seed money in place has often prompted other research agencies or companies to match funding or to loan equipment," says Pharr.

WCVM gained a third medical imaging specialist in 2002 when Dr. Kimberly Tryon (CAHF research fellow from 1998-2000) joined its faculty. More staff, plus the addition of the College's new *magnetic resonance imaging* (MRI) machine, means more opportunities for medical imaging research. And once the College's cobalt radiation machine begins operating in 2004, medical imaging specialists will participate in more projects that focus on cancer diagnosis and radiation therapy.

### Ophthalmology

When Dr. Bruce Grahn became WCVM's new veterinary ophthalmologist in 1992, the specialist had a list of equipment he needed to establish the College's ophthalmology program. The most expensive piece of equipment was a new operating microscope worth nearly \$60,000.

The Companion Animal Health Fund gladly helped WCVM pay the new microscope's bill. From the Fund's perspective, it was a worthwhile investment: for years, western Canadians had travelled to the United States to seek specialized eye care and testing for their pets. The region urgently needed its own full-service veterinary ophthalmology program.

Since then, the Fund has directed thousands of dollars to ophthalmology research conducted by Grahn and his residents. So far, Drs. Cheryl Cullen and Eric Storey have completed their ophthalmology training at WCVM.

"Most of our research focuses on two areas: glaucoma and retinal diseases," explains Grahn. "Glaucoma is frustrating to treat and we need a

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**TEMPLETON'S TRADITION:** In 2000, **Greg and Patricia Cooper** of Port Moody, B.C., donated \$2,000 to CAHF. A note accompanied their cheque: "Last year, Dewdney Animal Hospital (of Maple Ridge, B.C.) made a contribution in memory of our *Templeton*. We wish to continue this tradition." *Templeton*, who died in April 1999, was a seal point Siamese cat who lived most of his 15 years with the Coopers. "We were very fortunate and blessed to have him as long as we did," says Patricia.

**PADDY LOVE:** In honour of an apricot-coloured Poodle called *Paddy*, **Margaret Reason** of Lethbridge, Alta., donated \$44,000 to CAHF in 1988. When Reason made her donation, she expressed her appreciation and love for animals — especially *Paddy*, a 14-year-old dog owned by Reason's nephew.

**P.M. FUND RAISER:** In July 1985, **Dr. Brian Gibbs** of Central Animal Hospital in Saskatoon, Sask., donated all of his professional fees during one afternoon to CAHF. Gibb initiated the fund raiser as a way to celebrate Animal Health Week, and in following years, other western Canadian veterinarians followed suit.

better mode of therapy than what's currently available. As for retinal diseases, most are inherited and obviously we can prevent those, so it's where we need to do more research."

Grahn, first with surgical specialist Dr. David Fowler, then Cullen and Storey, developed a glaucoma shunt for long-term use in dogs. The shunt's initial patent was approved in 2002, and further studies are underway to test adjustable valved shunts.

In the area of retinal diseases, Grahn began investigating the inheritance of retinal detachment in Great Pyrenees dogs during the mid-1990s. As more advanced technology became available, Grahn teamed up with molecular diagnostics researchers Drs. Greg Appleyard and George Forsythe to test the use of a new comparison technique called *representation difference analysis* (RDA) for identifying affected dogs.

In 2002, Grahn, Appleyard and Forsythe investigated the disease process of geographic retinal dysplasia in Miniature Schnauzers. Last year, the scientists used RDA to identify candidate genes responsible for retinal dysplasia and retinal detachment syndrome in the breed.

Another series of research projects began in 1997 when Grahn detected retinal lesions in some Borzoi dogs. Storey conducted research to determine whether the lesions are inherited in Borzois. In 2002, after raising a test-bred litter from Borzoi dogs affected with retinopathy, Grahn and Storey are beginning to unravel the pathogenesis of this unique retinopathy.

Grahn's service now offers *posterior segment surgery* (retinal surgery) to pet owners. Besides providing clients with this specialty service, Grahn will use it as the basis for graduate student training and further research.

### Laparoscopic surgery

When laparoscopic surgery gained popularity in the 1990s, a group of WCVm surgical specialists became leaders in developing new ways to use the technology.

One of those specialists was Dr. Audrey Remedios, a former CAHF research fellow and WCVm faculty member: "Dr. Jim Ferguson, myself and Dr. Tanya Duke, our anesthesiologist, offered a laparoscopic surgery course to veterinarians from North America and Europe. We also taught a similar course to our graduate students," recalls Remedios.

With financial support from CAHF, WCVm researchers designed minimally invasive techniques for disc removals, spays and *thoracoscopies* (chest surgery) in dogs. "The thoracoscopy research was a joint project between surgery and anesthesia," says Remedios. "We looked at whether a thoracoscopy was less painful for the patient than standard, open chest surgery. My resident, Dr. Peter Walsh, did the surgery part of the research, and another resident, Dr. Shauna Cantwell, worked with Dr. Duke to do the anesthesia portion of it."

**MANITOBA ORGANIZER:** After **Elwood G. Smith** moved from his native Ontario to Winnipeg in 1955, he became one of Manitoba's most active dog breeders, exhibitors and judges. Smith, who bred standard Poodles, was instrumental in forming several provincial and national dog organizations including the Manitoba Canine Association and the Poodle Club Association of Canada. He was also a Winnipeg Humane Society board member and a Canadian Kennel Club director for Manitoba. In 1978, Smith became one of the Companion Animal Health Fund's first advisory board members. When he died several years later, many of his friends and the organizations that benefited from Smith's tireless efforts made memorial contributions to CAHF.

The WCVm research team presented their research and published their findings in international veterinary journals. "I still get calls about our research projects," says Remedios. "The research we conducted at the College didn't just have an impact in veterinary medicine: most of our work had practical applications for people as well as animals." 🐾



**CAHF FUELS INTERNATIONAL RESEARCH:** Drs. Cindy Shmon (left) and Sue Taylor were among the first group of North American researchers to begin investigating *exercise-induced collapse* (EIC) syndrome in Labrador Retrievers during the late 1990s. With financial support from the Companion Animal Health Fund, the WCVm researchers conducted extensive physical examinations and testing on 15 dogs with EIC. Taylor also evaluated more than 50 collapse episodes on tape and gathered questionnaires, pedigrees and blood samples from owners of affected Labradors. Those initial "pilot projects" helped Taylor and her colleagues secure additional funding from the U.S.-based Morris Animal Foundation for further clinical studies and genetic testing. Now, University of Minnesota researchers are close to identifying the genetic marker for EIC. This key piece of information will ultimately help scientists develop a genetic test for this syndrome.