Veterinary Oncology Network (VON)

Mission of the VON

Companion animal oncology is a growing field of research.
Given the increase in life expectancy in companion animals, the incidence as well as the prevalence of cancer are rising in both dogs and cats. Moreover, pet owners' expectations have raised substantially. Hence, the ability to cure companion animals with cancer has a high social impact. The past decennia, companion animal veterinary medicine experienced a remarkable evolution, with human medical technologies increasingly finding their applications in veterinary medicine. This is accelerated by the **win-win scenario** of translational studies on both novel cancer diagnostics and therapeutics.

Thanks to these advanced diagnostics and better equipment, cancer diagnoses are made in an earlier stage of the disease, a larger variety of treatment opportunities are now available, and these treatments are becoming more effective. However, there is still **room for research** to better understand mechanisms of action, improve the identification of treatment responders and the prediction of toxicity as well as to develop and test novel treatments.

In order to exploit this unique opportunity at Ghent University, a number of Ghent University Veterinary research teams have joined hands to perform veterinary oncology research.
It is our explicit aim to provide a platform for both the veterinary and the human oncology fields. To this end, we want to catalyze collaborations between labs and clinicians by matching existing technologies with access to clinical samples.

What makes the VON unique?

The Faculty of Veterinary Medicine holds a unique position in Flanders:
- We house a very strong research community (Faculty of Veterinary Medicine of Ghent University - Shanghai global ranking nr 1 in Veterinary Sciences since 2017)
- We are the only Small Animal Teaching Hospital in Flanders
- We have a high case load: new cancer cases are diagnosed and treated daily
- We have readily access to veterinary patient samples
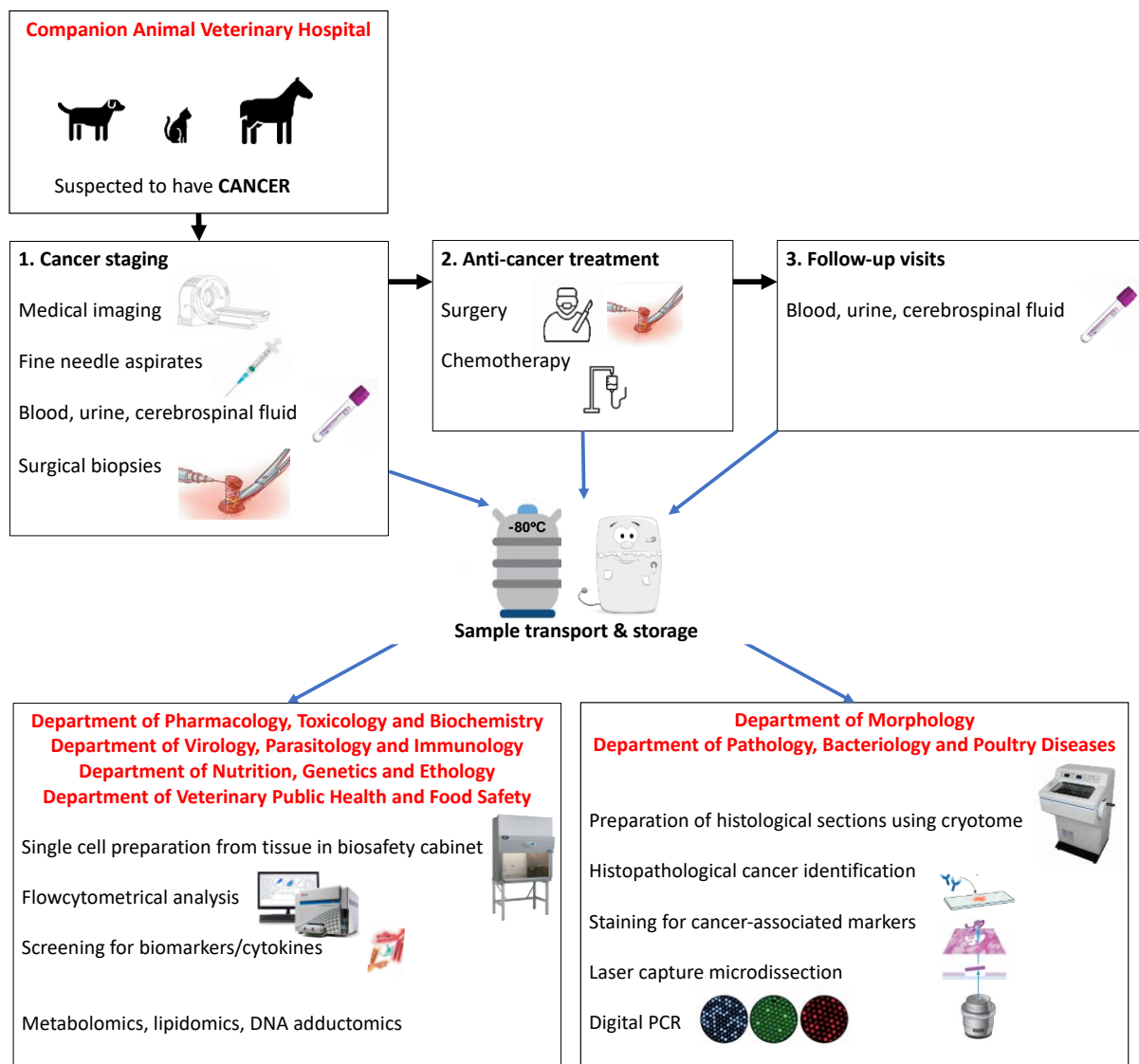- We offer a number of unique technological platforms

Fig 1: Cancer patient sample flow

What is the VON looking for?

We seek collaboration on 2 levels:

1. **Explore targets to improve cancer diagnostics and treatments for companion animals**

Our approach is to explore novel therapeutic strategies and learn from successful innovations in human oncology by investigating whether the same or other pathways and concomitant targets exist in dogs and cats for preventive and/or curative healthcare.

2. **Companion animals as translational models for humans**

Companion animals with naturally occurring cancer are an invaluable source of biological samples, not only to improve veterinary, but also translational cancer research (i.e. beneficial for the human clinic). **Companion animals with cancer are a recognized, but still severely underexploited tool for advancing human patient anti-cancer strategies**.

Indeed, cancers in pets display striking similarities to those in humans.

- Tumors develop in companion animals with an **intact immune system**, and, as in human patients, metastatically spread, recur and/or become a drug-resistant disease over time.
- Furthermore, companion animals share a **similar histological, biological, and genetic cancer background** with humans. These similarities are -in general- significantly higher than the relationship between rodents and man.
- **Corresponding diagnostic and treatment options** are available for dogs and humans, while the progression of cancer in companion animals is **faster** allowing to obtain results within a reasonable period of time and/or allows innovative trial designs such as prophylactic cancer vaccine tests in a realistic setting.
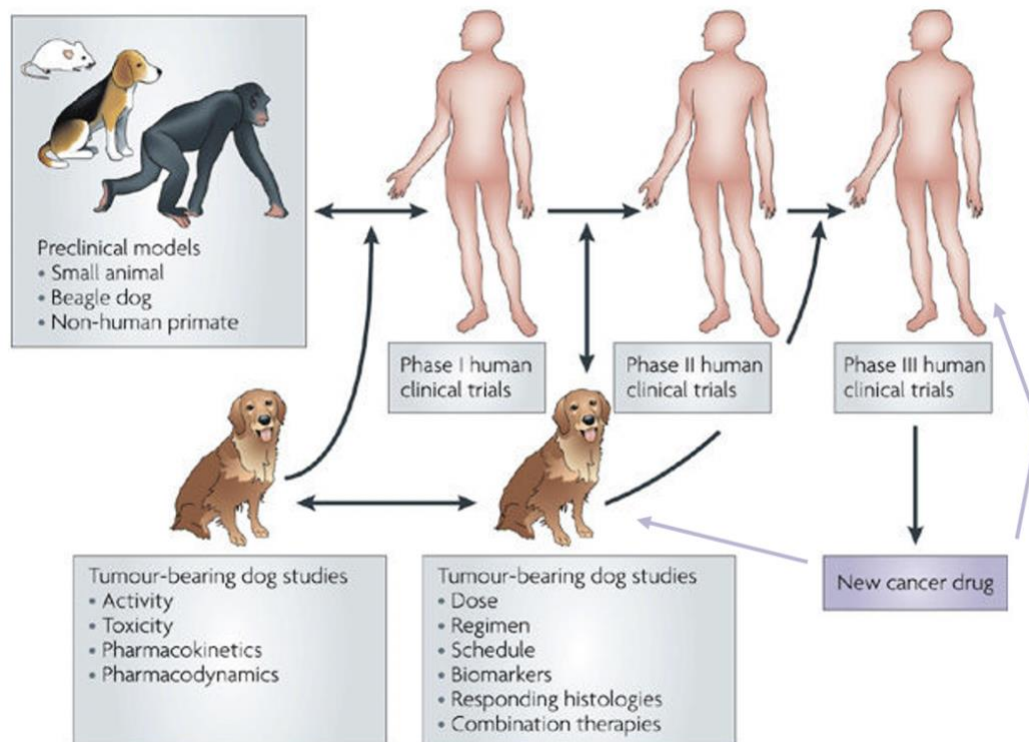
Nature Reviews | Cancer

Fig. 2: Integration of companion animals with spontaneous cancer in the drug discovery and development process creates a win-win situation benefitting both human and companion animals. Paoloni & Khanna. Nat Rev Cancer. 2008 Feb;8(2):147-56.

What can we offer?

The Faculty of Veterinary Medicine harbours expertise and research capacity (not limited to):

- Both clinical and preclinical animal models:
  - spontaneous tumor (client-owned dogs, cats and horses)
  - primary tumor modeling (triple-negative breast cancer, melanoma, lung cancer, … (*in vivo* mouse model))
- Clinical trials screening novel therapeutic approaches
- *In vitro* screening of (immune)therapies, *in vitro* and *in vivo* angiogenesis models, preclinical pharmacokinetics: PK modeling and ADME parameter characterization
- Bio-analysis: ultrasensitive quantification of chemotherapeutics in animal matrices, microbiome analysis: differences in microbiome composition affect how medicinal compounds are processed.
- (Tumor) samples characterization:
  - flow cytometric immunophenotyping and viability/cell death analysis
  - laser capture microdissection
  - digital PCR, identification of comparative mutations and epigenetics (sequencing and analysis via bioinformatics)
  - histopathological tumor diagnosis, grading and analysis of vascularisation
- Immunology:
  - immune cell characterization + cytokine responses
  - live cell microscopy
- Metabolomics:
  - polar metabolomics, lipidomics & DNA adductomics using Ultra High-Performance Liquid Chromatography hyphenated to High Resolution Mass Spectrometry (UHPLC-HRMS) in feces, urine, blood, tissue, saliva, cell lines, …
  - rapid point-of-care fingerprinting using Laser Ablation - Rapid Evaporative Ionisation Mass Spectrometry (LA - REIMS) in feces, urine, blood, tissue, saliva, cell lines, …
- Imaging:
  - 320 CT, MRI, (contrast-enhanced) ultrasound, radiography, scintigraphy
  - in vivo imaging system (IVIS)
  - near-infrared fluorescence (sentinel lymph node mapping, image-guided surgery)
- Treatment: chemotherapy, surgery, nuclear medicine, immunotherapy

The VON team

The Faculty of Veterinary Medicine houses a growing number of researchers with complementary expertise in oncology, as well as with a particular interest in oncology in the One Health context.

Prof Bart Broeckx
Prof Koen Chiers
Prof Eric Cox
Prof Siska Croubels
Prof Sylvie Daminet
Prof Mathias Devreese
Prof Bert Devriendt
Prof Hilde de Rooster
Prof Ward De Spiegelaere
Prof Ann Martens/ Dr. Maarten Haspeslagh
Prof Evelyne Meyer/ Dr. Jonas Steenbrugge
Prof Niek Sanders
Prof Lynn Vanhaecke/ Dr. Lieselot Hemeryck

Contact

VON@ugent.be