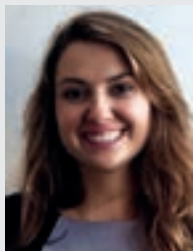


'One Health' Comparative Oncology Research

Comparative oncology is the discipline that integrates naturally occurring cancers seen in veterinary medicine, into more general studies of cancer biology and therapy in humans, including the study of cancer-pathogenesis and new treatments¹. Several comparative oncology projects are currently ongoing in UCD

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Professor Amanda McCann,

PhD, Principal Investigator, Senior
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Institute of Biomolecular and
Biomedical Research in UCD

Two 'One Health' comparative oncology projects involve a collaborative group of researchers from the School of Veterinary Medicine and the School of Medicine. This multidisciplinary group includes: Dr Pamela Kelly, Veterinary Pathologist; Professor Shirley Potter, Consultant Plastic and Reconstructive Surgeon at the Mater Misericordiae University Hospital; and Professor Amanda McCann, Principal Investigator and

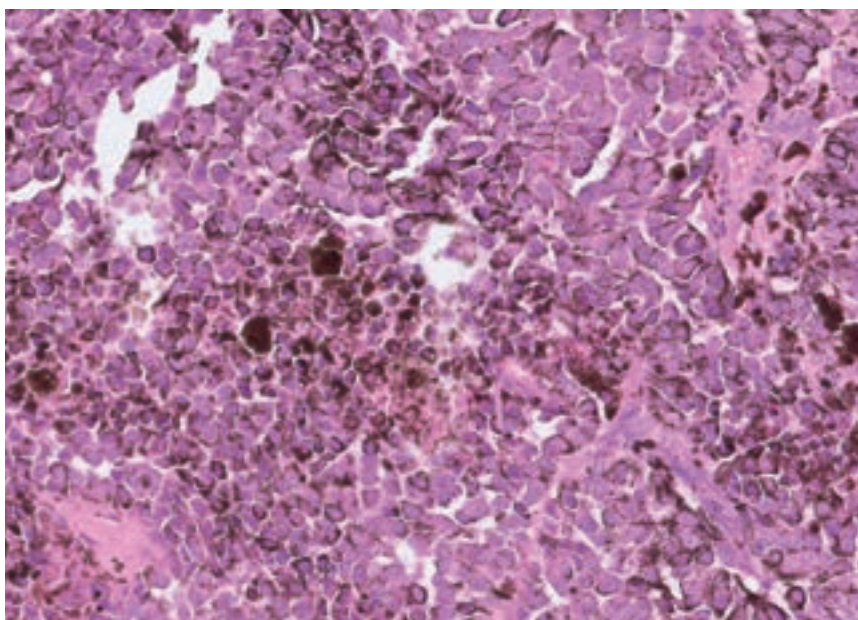


Figure 1: Histology of canine melanoma.

Senior Conway Fellow in the UCD Conway Institute of Biomolecular and Biomedical Research. Dr Stephanie Bollard and Jane Howard are PhD candidates in the group.

COMPARATIVE ONCOLOGY: MELANOMA

Dr Stephanie Bollard is a Specialist Registrar in Plastic and Reconstructive Surgery. Stephanie is an Irish Clinical Academic Training (ICAT) fellow currently undertaking a PhD in Comparative Oncology with a focus on melanoma. Melanoma, the most aggressive skin malignancy, is responsible for 80 per cent of skin cancer deaths, yet our molecular understanding of this disease is poor. Chemokines are small chemoattractant cytokines that regulate cell trafficking in the tumour microenvironment and have become of interest as potential therapeutic targets². Naturally occurring canine melanoma is one of the most common and aggressive malignancies in dogs (Figure 1),

which shows striking biological homologies with human melanoma, therefore representing a valuable, novel, spontaneous, translational animal comparative cohort. Studying melanoma in both humans and dogs in parallel offers many advantages, as any findings will remain applicable to both species, and potential therapeutics are also more likely to apply to both. Our research in UCD centres around identifying the role of chemokines in melanoma progression in humans and dogs, and its association with other markers of aggression such as mitotic index and tumour grade, looking at retrospective histology slides. We hope to expand this research to examine the role of chemokines in circulation, recruiting dogs with melanoma to our study and analysing plasma.

COMPARATIVE ONCOLOGY: MAMMARY ADENOCARCINOMA

Jane Howard BSc, a graduate of Biomedical, Health and Life Sciences,

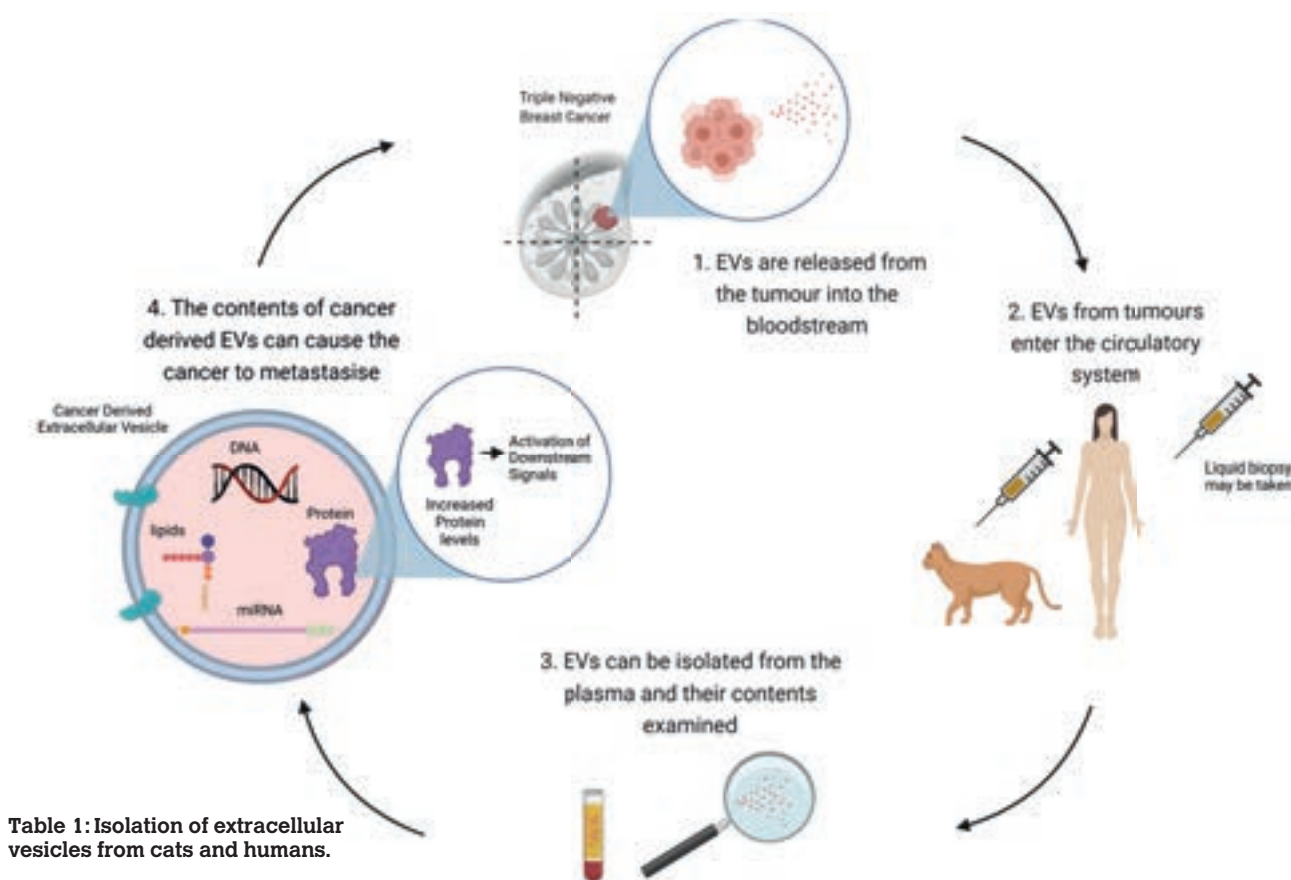


Table 1: Isolation of extracellular vesicles from cats and humans.

UCD, is currently in the second stage of her PhD. Jane's project is focused on triple negative breast cancer (TNBC) in women and mammary adenocarcinoma in cats and is funded by the UCD Advance PhD programme. Feline mammary adenocarcinoma (FMAs) is the third most common tumour in cats. Most FMAs are malignant and demonstrate highly aggressive metastatic behaviour. Surgery alone remains the treatment of choice for these patients in Ireland. To develop earlier diagnostic tests and effective treatments, and to improve patient outcomes, we must understand the biology underpinning FMA. Research has demonstrated that cats may represent a comparative model for investigation of mammary carcinogenesis, most notably, Triple Negative Breast Cancer (TNBC)^{1,3}. TNBC is a subtype of breast cancer that typically lacks the expression of the oestrogen receptor (ER), progesterone receptor (PR), and does not overexpress the human epidermal growth factor receptor 2 (HER2). Targeted treatments are therefore limited. Extracellular Vesicles (EVs) are nanoparticles found in all biological fluids⁴. They have recently gained traction as biomarkers of disease as they are easily accessible from 'liquid biopsies' such as urine or plasma. In the cancer setting, EVs are known to facilitate intercellular communication and promote metastatic activity. miRNAs are small non-coding RNAs that can act as oncogenes, tumour suppressors or metastatic regulators in cancer. miRNAs packaged inside EVs play an important role in promoting metastasis by facilitating cell communication. One Health studies aim to

investigate whether miRNAs are associated with FMA and TNBC and whether they or other proteins may be detected and used as a cancer biomarker in EVs from plasma (Table 1, created with Bio-render). This study will pave the way for the identification of novel therapeutic targets for the treatment of feline mammary adenocarcinoma and triple negative breast cancer.

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