

The Oncolytic Potential of the Human Virus in Canine Tumors

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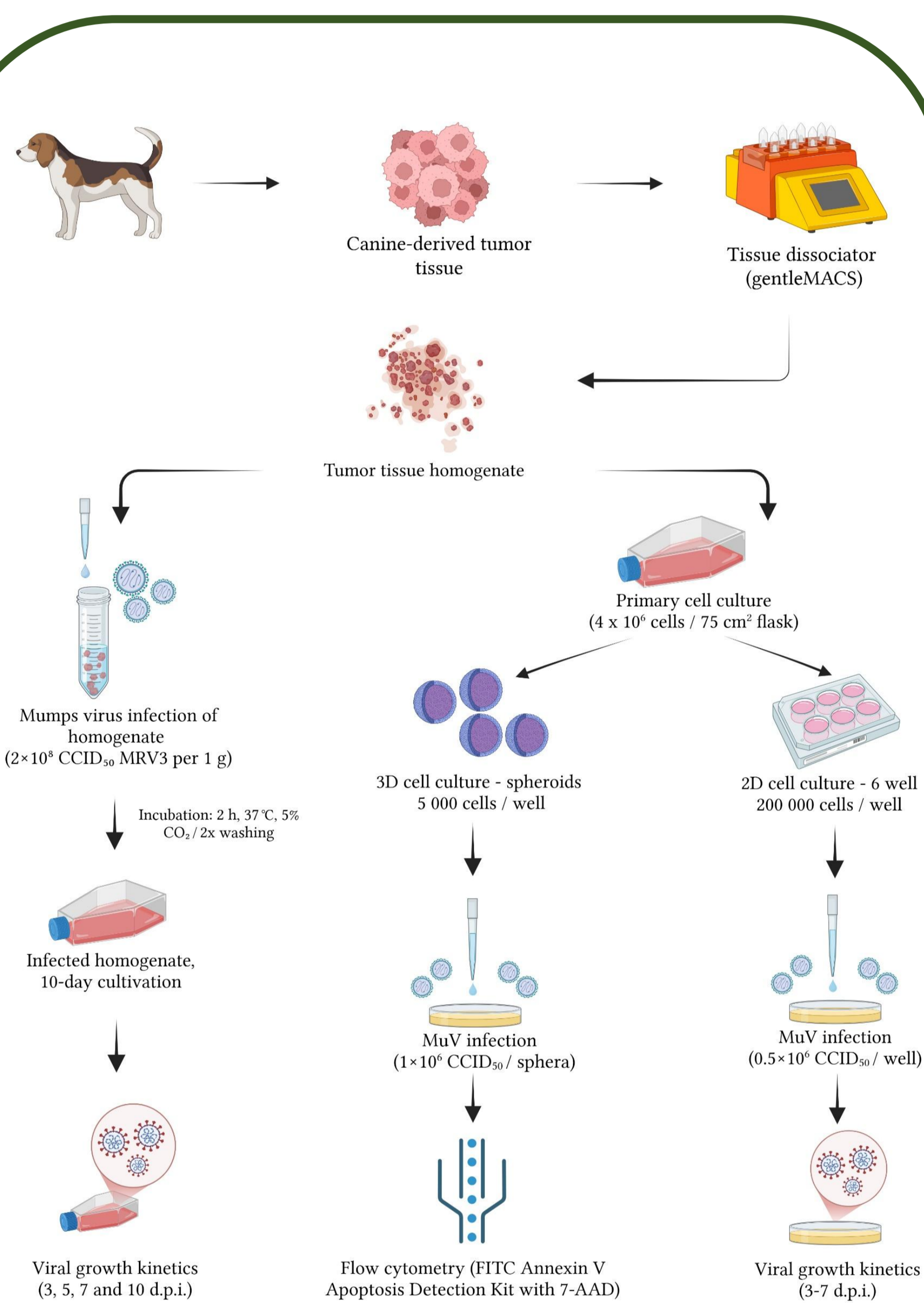


INTRODUCTION

Companion animals, especially dogs, play an increasingly important role in human lives, positively affecting emotional, social, and physical well-being. Improved veterinary care and close human-animal cohabitation have extended their lifespans, but also increased the incidence of cancer, now one of the leading causes of death in pets. Conventional treatments—surgery, chemotherapy, and radiotherapy—often prove insufficient, with frequent relapse. This highlights the need for innovative therapies (1,2). Oncolytic virotherapy has recently emerged as a promising alternative in both human and veterinary oncology, offering potential for more effective cancer treatment. The mumps virus (MuV), a member of the Paramyxoviridae family, demonstrates strong potential as an oncolytic agent (3). Due to the natural resistance of animal species to MuV infection, this virus enables selective targeting and destruction of tumor cells while minimizing the risk to healthy host tissues.

The aim of this study includes investigating the oncolytic properties of the mumps virus in various primary tumor tissue cultures obtained through surgical tumor extraction. The study examines the tumor-selective replication of the virus and its cytotoxic effects. Using an *ex vivo/in vitro* models, the aim is to evaluate the feasibility of implementing oncolytic virotherapy with a mumps virus in canines.

WORKFLOW

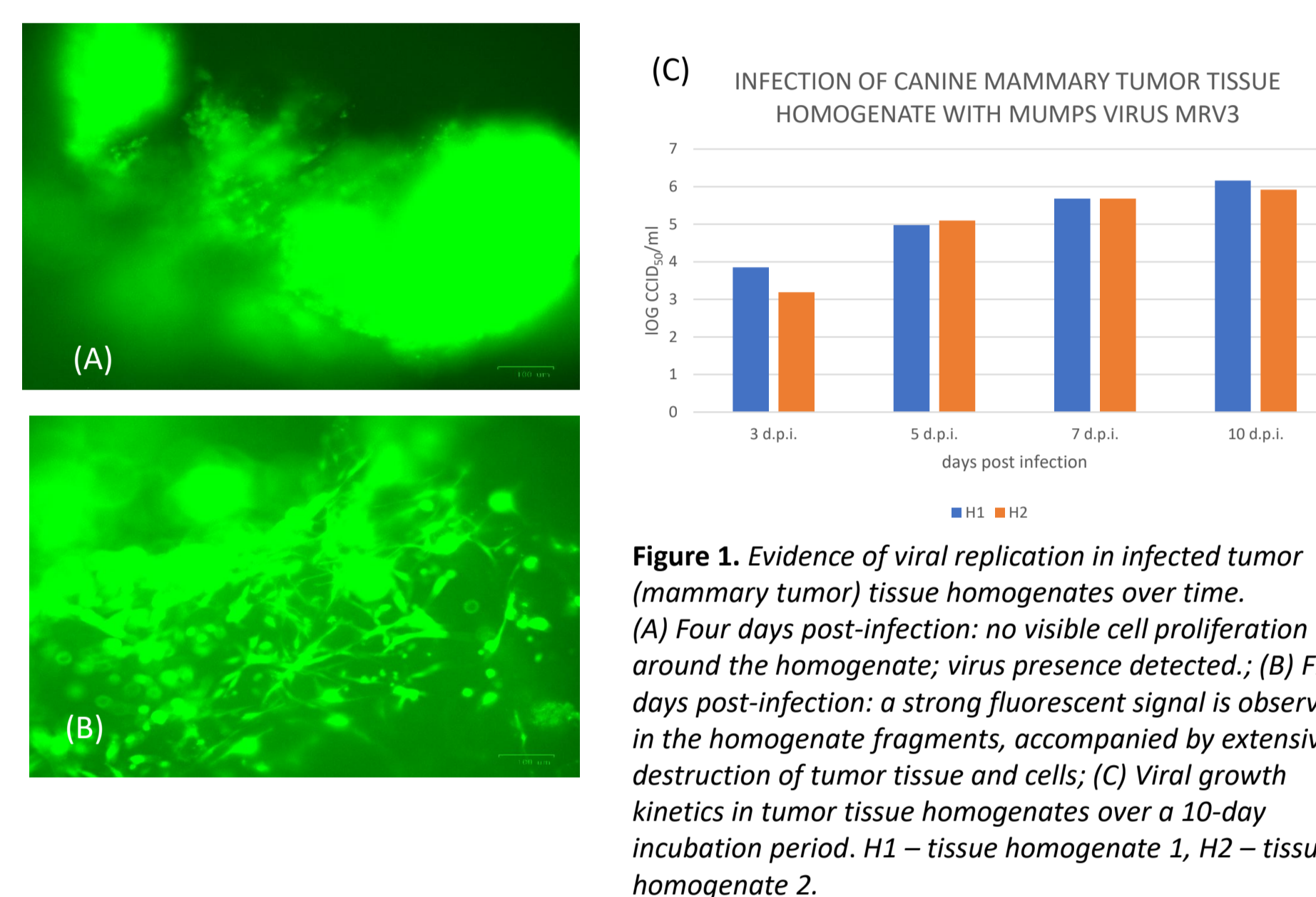


MuV strains used in this study included: L-Zagreb (genotype N) (Institute of Immunology, Inc.) (abbr. L-Zg), VarA (plaque purified L-Zagreb variant) and Urabe AM9 (genotype B) (1st International Reference Reagent for Mumps Vaccine, National Institute for Biological Standards and Control [NIBSC])(4,5). Recombinant viruses MRV2, Vdeopt-MRV2 (abbr. dPV) and MRV3 (NCBI GenBank accession numbers [MZ929423](#), [MZ964864](#) and [MZ929424](#), respectively) were based on the L-Zagreb strain with several modifications (6). The recombinant mumps virus MRV3 expressing green fluorescent protein (GFP) was used to infect homogenates and spheroids, allowing for enhanced visualization under experimental conditions.

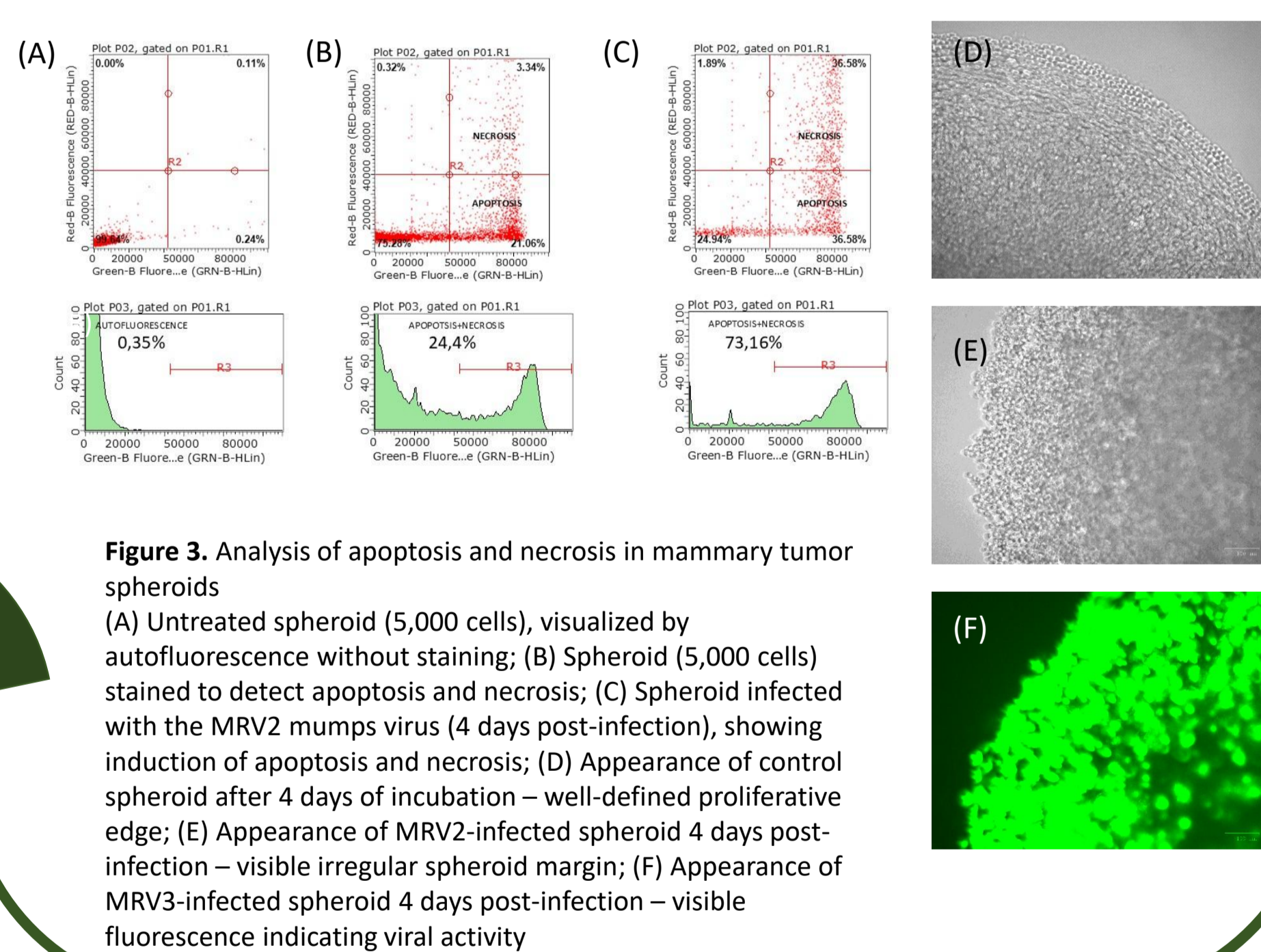
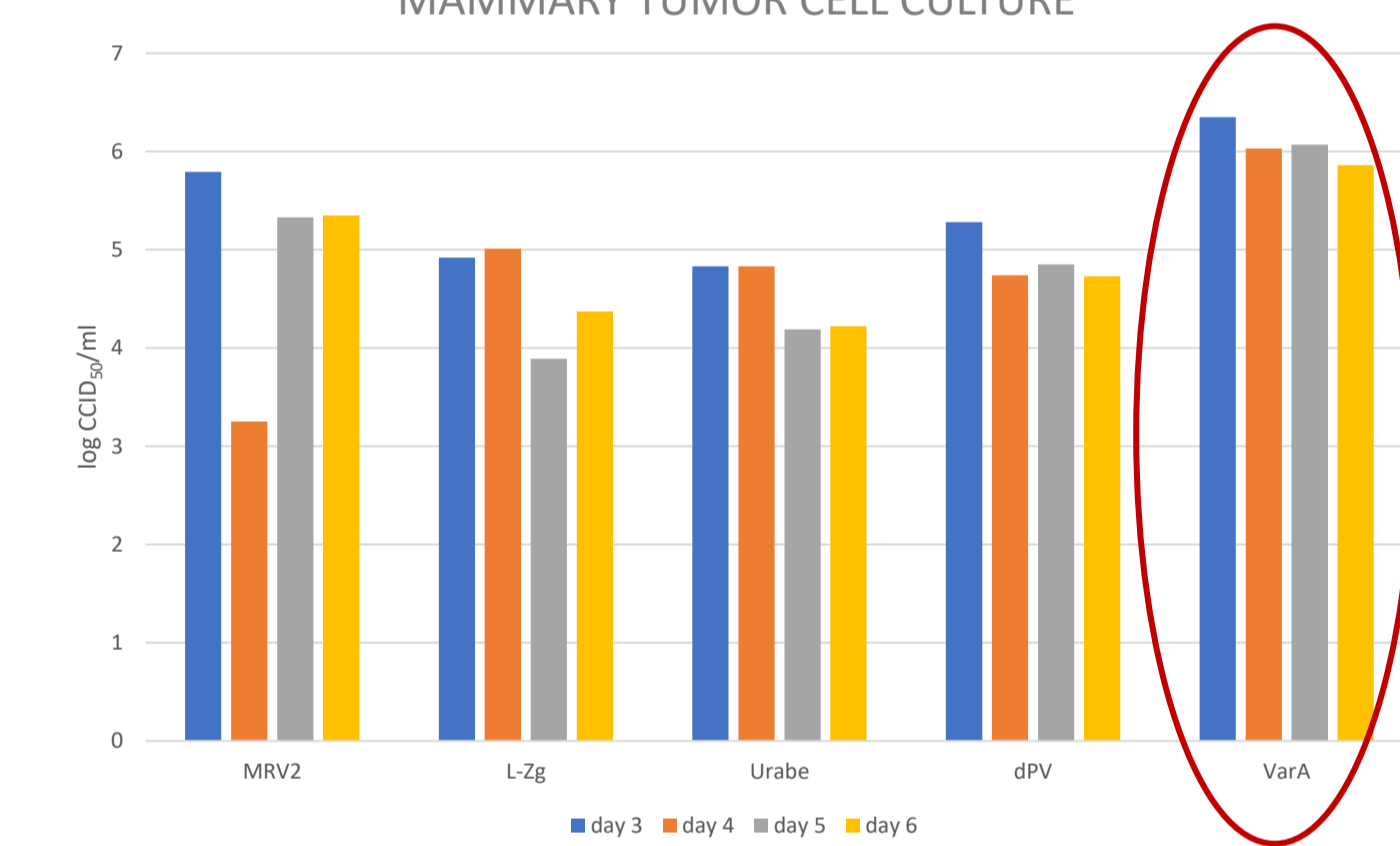
RESULTS

Significant replication of the mumps virus was observed in tissue homogenates derived from two canine tumor types – mammary carcinoma and soft tissue sarcoma – over a 10-day period. Infection of primary 2D cell cultures, established from these tumor homogenates, demonstrated a pronounced replication of various mumps virus strains, with strain VarA achieving the highest viral titer. Furthermore, 3D spheroids infected with the MRV2 strain showed a marked increase in cell death. At 4 days post-infection, flow cytometry analysis revealed that 73.16% of the cells within mammary tumor spheroids underwent apoptosis and necrosis.

MAMMARY GLAND TUMOR (tubulopapillary carcinoma)



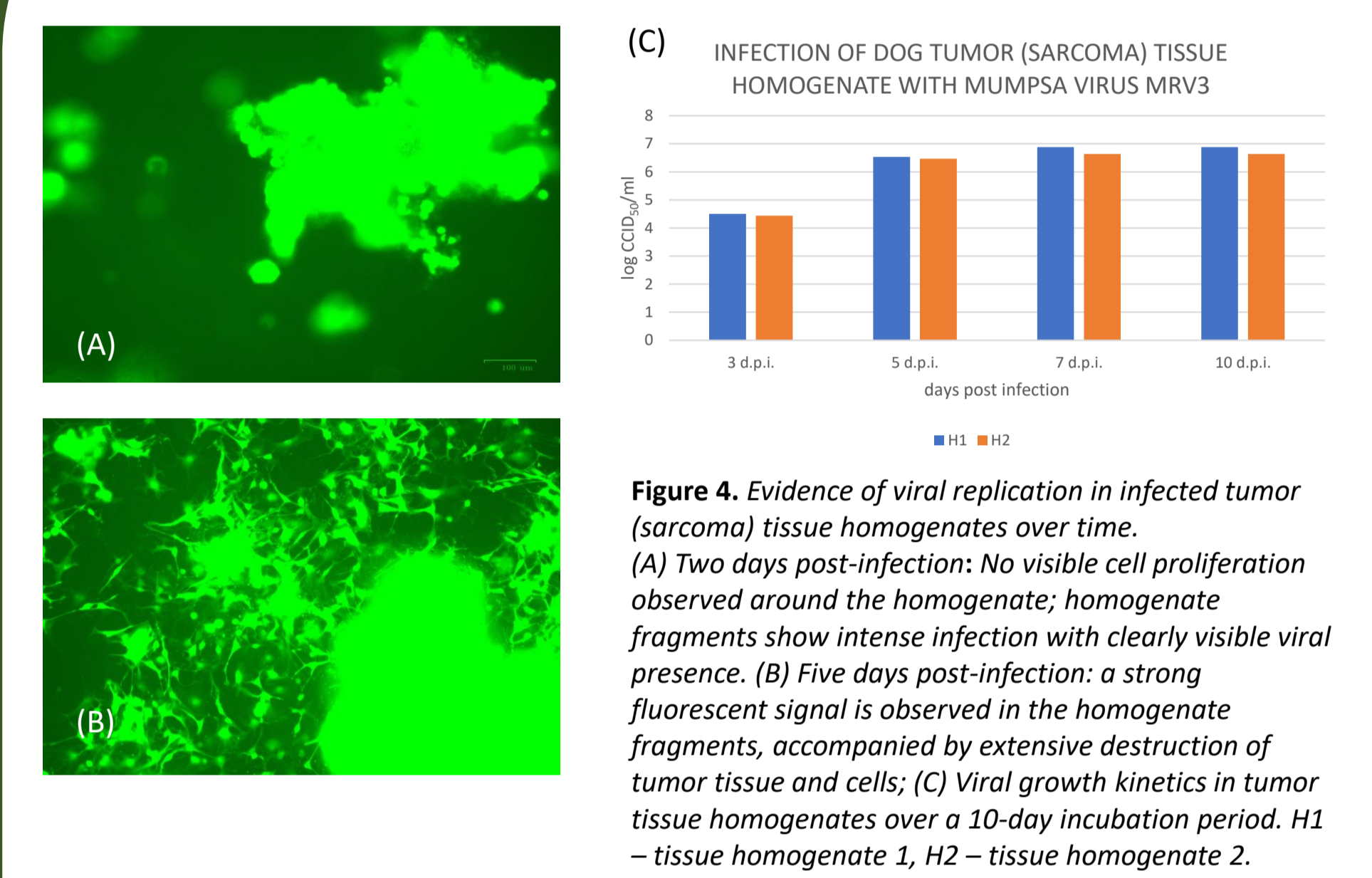
VIRAL GROWTH KINETICS IN PRIMARY CANINE MAMMARY TUMOR CELL CULTURE



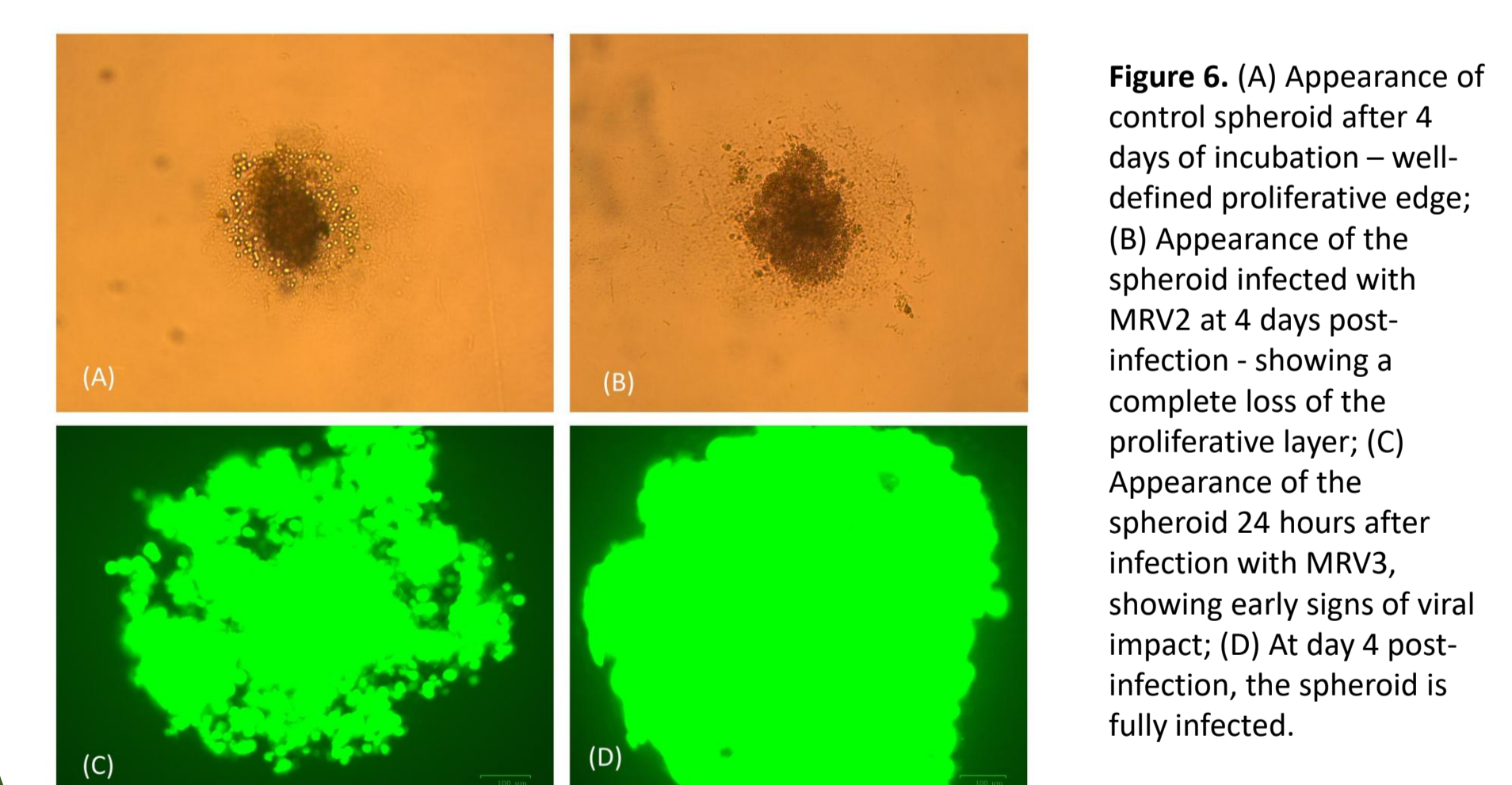
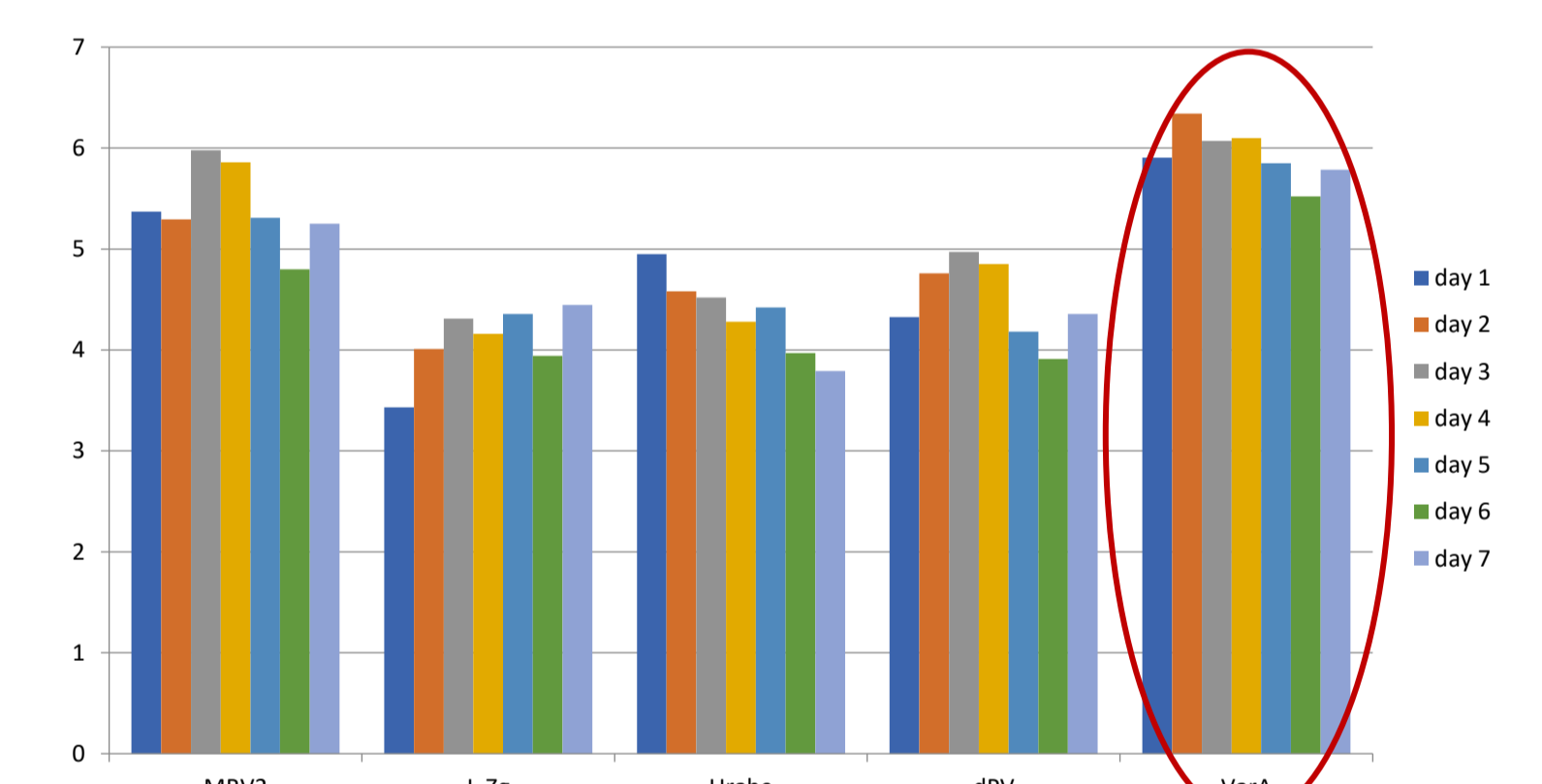
CONCLUSIONS

We present preliminary results demonstrating that the mumps virus efficiently infects tumor cells, exhibiting oncolytic activity against mammary tumors and soft tissue sarcomas. The effectiveness of the virus was confirmed on tumor tissue homogenates, as well as on their primary tumor cells in 2D and 3D *in vitro* models. Our results represent an important step in the development of new therapeutic approaches for difficult-to-treat forms of cancer in dogs.

SOFT TISSUE SARCOMA



VIRAL GROWTH KINETICS IN PRIMARY CANINE SARCOMA CELL CULTURE



LITERATURE

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Acknowledgements

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