A Retrospective Look At Survival Times Of Canine Cancer Patients Treated With Innovarius Ultra High Frequency Resonant Therapy

Madeira Mas
Faculty Mentor: Dr. Nizam Uddin
Department of Statistics, University of Central Florida

KEY TERMS

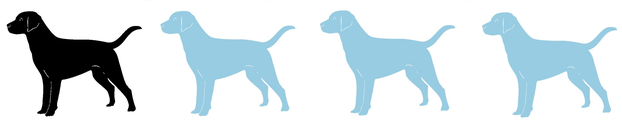
Immunotherapy: the prevention or treatment of disease with substances that stimulate the immune response
Hyperthermia therapy: a type of medical treatment in which body tissue is exposed to higher temperatures
RF: Radiofrequency
EMFs: Electromagnetic Fields

ABSTRACT

This study explores the use of Innovarius LLC's non-invasive Ultra High Frequency Resonant Therapy on 41 canine cancer patients. The hyperthermia treatment was given in addition to traditional and/or holistic methods of cancer treatment. Survival times of these patients were compared to their lower expected survival times and higher expected survival times based on their prognoses. Results indicated that the addition of the Ultra High Frequency Resonant Therapy does not negatively affect survival times. Efforts to determine factors associated with survival time were also implemented. Further analysis showed that only tumor type, age, and treatment length are significantly associated with survival time.

BACKGROUND

- **Cancer is the #1 disease related killer among cats & dogs**
- **About 1 in 4 dogs develop cancer throughout their life**



➢ **Common Cancer Treatment Options**

- Immunotherapy
- Radiation
- Chemotherapy
- Surgery

Hyperthermia Therapy

- Some hyperthermia therapies use RF EMFs that are **amplitude-modulated at frequencies specific to the patient's tumor** (Zimmerman et al., 2013).
- These RF EMFs **heat the body's tissue to destroy the cancer cells and promote an immune response** to the heated area (Ebrahimi, 2016).
- Studies have shown a promising future with this type of treatment as it is **not associated with any significant adverse effects** and **produces long term objective results** (Zimmerman et al., 2013).

❖ **Although there have been studies considering the effectiveness of hyperthermia treatments** (i.e. Smrkovski et al., 2013, Gillette, E L. 1982, Hidefumi et al., 2014), **there are not as many that explore further details within the data.**

References
Gillette, E L. (1982). Hyperthermia Effects In Animals With Spontaneous Tumors. National Cancer Institute Monograph 61: 361-364. MEDLINE.
Hidefumi, T., Kazuo, A., Tomohiro, O., Norihiko, I., Shinichi, N., Yasuho, T., & Yoshiharu, O. (2014). High temperature hyperthermia treatment for canines exhibiting superficial tumors: A report of three cases. Oncology Letters, 8(5), 2055-2058. doi:10.3892/ol.2014.2496
Smrkovski, O. A., Koo, Y., Kazemi, R., Lembcke, L. M., Fathy, A., Liu, Q., & Phillips, J. C. (2013). Performance characteristics of a conformal ultra-wideband multilayer applicator (CUMLA) for hyperthermia in veterinary patients: a pilot evaluation of its use in the adjuvant treatment of non-resectable tumours. Veterinary And Comparative Oncology.
Zimmerman, J., Jimenez, H., Pennison, M., Brezovich, I., Morgan, D., Mudry, A., & ... Pasche, B. (n.d). Targeted treatment of cancer with radiofrequency electromagnetic fields amplitude-modulated at tumor-specific frequencies. Chinese Journal Of Cancer, 32(11), 573-581.

OBJECTIVES

1) **Discover factors that influence survival time** with the Ultra High Frequency Resonant Therapy to have a better idea of a canine's specific outcome.
2) **Gain a better understanding of how the Ultra High Frequency Resonant Therapy affects survival time** by comparing the patient's survival time to their expected survival times (prognosis) based on their condition.

❖ **It was hypothesized that there would be at least an association between age, breed size, and type of tumor with survival time and that actual survival times will be higher than expected survival times.**

METHODS

- Data on 41 canine cancer patients obtained from Innovarius LLC at the Animal Hospital at Baldwin Park, Fl through Dr. Albert Nunez

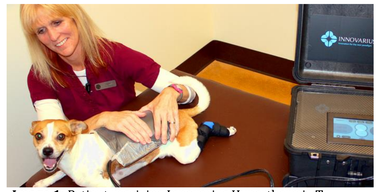


Image 1: Patient receiving Innovarius Hyperthermia Tx

Image 2: Patient receiving Innovarius Hyperthermia Tx

Image 3: Patient with melanoma on back of throat deemed inoperable by a board certified oncologist

Image 4: 2.5 months later with addition of hyperthermia Tx once a week, tumor is almost unattached

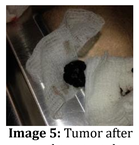


Image 5: Tumor after removal on same day as image 4

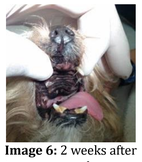
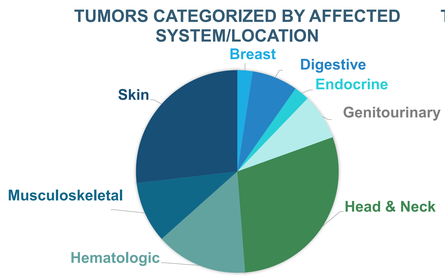


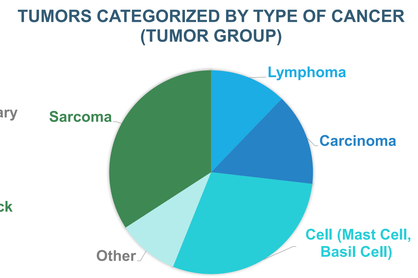
Image 6: 2 weeks after tumor removal

Note: This patient arrived at 14 yrs old and died at 16.5 yrs old due to old age

- **Survival Time** =# of days from start of Tx to death or present day if still alive
- **Quantitative Variables:** Treatment Length & Age at Start of Treatment
- **Categorical Variables:** Gender, Breed Size, Tumor System, Tumor Group

- Tumors were 1st grouped by system then by type of cancer in attempt to create more even groups





1. Tested if survival times were above lowest & highest prognosis with Wilcoxon Signed-Rank Test. (Data not censored for patients that were still alive).
2. Censored the data & used the LIFETEST procedure in SAS to test the homogeneity of the survival curves among each of the categorical variables.
3. Used the LIFEREG procedure in SAS to fit data to Exponential, Weibull, Llogistic, Logistic, and Gamma distributions. The model with the lowest AIC was chosen as the best fitting model.

RESULTS

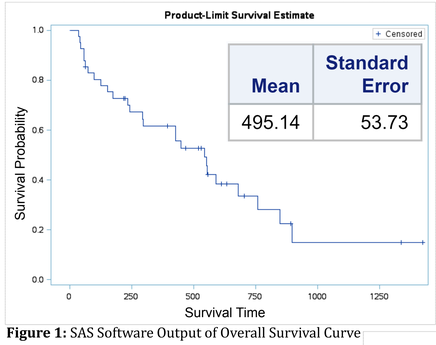


Figure 1: SAS Software Output of Overall Survival Curve

Alternative Hypothesis	p-value	Does Data Support Hypothesis?
Survival Time > Lowest Prognosis	0.015	Yes
Survival Time > Highest Prognosis	0.99	No

Table 1: Wilcoxon Signed-Rank Tests of Survival Times vs Prognoses p-value Results (37% of patients were still alive)

❖ **Tumor Group was the only categorical variable that was shown to affect survival time**

Test of Equality over Strata			
Test	Chi-Square	DF	Pr > Chi-Square
Log-Rank	19.8022	4	0.0005
Wilcoxon	14.4816	4	0.0059
-2Log(LR)	15.0382	4	0.0046

Figure 2a: SAS Software Tumor Group Test of Homogeneity Results

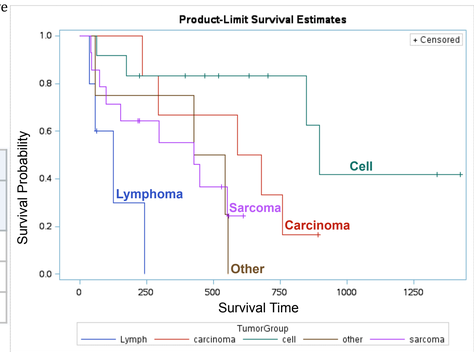


Figure 2b: SAS Software Survival Curves by Tumor Group
-Displays how survival times differ by Tumor Group

➢ **The Gamma model was chosen & displayed a positive relationship between Treatment Length & Survival Time and a negative relationship between Age & Survival Time**

CONCLUSIONS

- The addition of Innovarius Ultra High Frequency Resonant Therapy does not negatively affect survival times as patients' survival times were significantly higher than their lowest prognosis
- Tumor Group, Age at Start of Treatment, and Treatment length are factors that influence survival time

Limitations: Unable to accurately keep track of all the Tx pairings & did not have controls to test the survival data against. Also, sample size per variable group was small. Because some of the patients were still alive this limited the results when testing survival times against their prognosis.

Future research should also include measures of the quality of life of patients treated with non-invasive hyperthermia treatments versus patients treated with traditional methods.

ACKNOWLEDGEMENTS

INNOVARIUS
Innovation for the next paradigm
Animal Hospital at Baldwin Park

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