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A special advertising section

A multi-center case series on laser therapy

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For The Education Center

Over the last five years, there has been a dramatic increase in the use of laser as a therapeutic modality in small animal veterinary clinics. The popularity has correlated directly with the availability of higher-powered Class IV therapy lasers; there are, however, a wide variety of laser devices on the market with an extensive array of features and a deafening amount of marketing hype to back up their claims.

Unfortunately, to date there has been a shortage of good clinical research to establish clear and effective dosing strategies to produce consistent clinical results. The goal of the researchers participating in this study is to report the first large series of data using consistent dosing parameters to help establish an informed dosing strategy for the clinician.

Laser therapy uses photobiomodulation to stimulate cellular metabolism, reduce inflammation and speed the natural healing process. A number of biochemical mechanisms have been described previously that facilitate this effect[1]. The key to effective laser therapy treatment is therefore the delivery of an adequate amount of therapeutic light to the necessary anatomical structures.

Initially, this would seem to only require a simple calculation of the amount of light delivered and the depth of tissue penetration. But in the current environment with little data to substantiate claims, the dosing conversation quickly deteriorates into claims about laser pulsing parameters and different wavelengths of invisible light. This can be tedious for a population of potential users trained in veterinary medicine rather than laser physics.

Although a recent review of the literature concluded that continuous emission of light (CW) remains the gold standard for clinical efficacy[2], and a wide therapeutic window of laser wavelengths has been demonstrated to be efficacious[1], a cloud of confusion remains. The goal here is to provide the first large series of cases using a consistent dosing strategy to establish the efficacy of laser therapy in the small animal clinic.

Methods

Case data were collected over four months from Pierrefonds Animal Hospital, Ste. Genevieve, Quebec, Canada; Stoney Creek Veterinary Hospital, Morton, Pa., United States; and Dyrlægehuset, Odense, Denmark.

All cases were treated with Companion CTS or CTC laser therapy devices using pre-set protocols and SmartCoat dosing technology. Patient assessments were scored on a four-point scale * (excellent, good, average, poor) by the clinician and correlated to appropriate quantitative measures for the condition when possible.

For example, rehabilitation outcomes after stifle repair or hip dysplasia were tallied by improvements in lameness scoring. Similarly, most wound-healing outcomes were graded by measures observed in the clinic or reported by the owner. All cases with sufficient information to draw a clinical conclusion by the end of the collection period were included in the study.

In addition to the treatment protocols provided with the laser therapy system, condition-specific treatment heads were used to optimize delivery. Conditions such as wounds or lick granulomas were treated off-contact with the large, conical treatment head. Deep muscular injuries including hip dysplasia and osteoarthritis were treated with the large convex contact treatment head that can be used to compress superficial tissues, displacing excess fluid and enhancing laser penetration to deep structures.

Conditions such as otitis and post surgical wounds, which require delivery of laser to tight spaces or of smaller laser spot sizes, were treated with small contact or non-contact treatment heads.

A summary of the conditions that were treated and average treatment parameters is presented in Table 1.

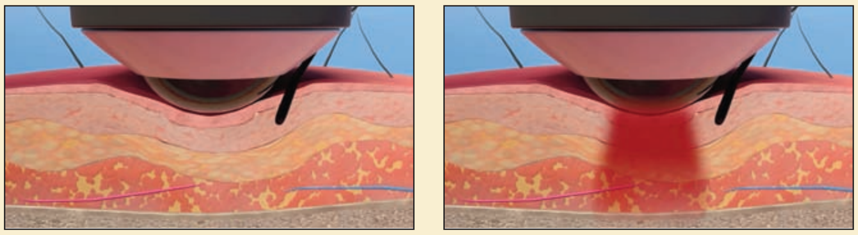
Table 1

Condition	Dogs	Cats	Average Joules	Dosing Range (J/cm^2)
abscess	0	5	810	6-8
anal gland	5	0	721	6-8
bruise/trauma	1	0	900	8-10
claudication	1	0		8-10
ear infection	8	1	1395	3-4 superficial
8-10 deep fracture	2	3	1486	8-10
hip dysplasia	3	1	1162	8-10
hot spot	7	1	1080	3-4
infected wound	2	0	623	3-4
IVDD	8	2	927	8-10
kidney stone	0	3	912	8-10
lick granuloma	9	0	1430	20-30
ligament	34	0	1870	3-4
operative wound	10	19	459	3-4
osteoarthritis	5	1	1716	6-10
pain	7	3	3450	8-10
wound (superficial)	18	6	1440	3-4
Total	**120**	**45**		

Results and Discussion

In all, 165 cases were contributed from the three sites. The reported cases are indicative of a random sampling of the standard caseload in a small animal veterinary practice. A summary of the conditions and average treatment parameters is provided in Table 1. Across all sites, tissue treatment areas from $100cm^2$ to $700cm^2$ were treated with dosing of 3 to 4 Joules/ cm^2 for superficial conditions and higher dosing of 6 to 10 J/cm^2 for deeper pathologies. This is a dosing strategy that can only be achieved clinically with the higher output power provided by a Class IV therapy laser.

These dosing parameters were observed to be overwhelmingly effective by the patient assessments summarized in Table 2. Of the 120 canine cases, 95.8 percent were judged to have outcomes defined as good or excellent. A similar trend was observed in the results for the feline population of 45 cases with 93.3 percent of the outcomes scored as good or excellent.



Compression of superficial tissues with laser firing, at right.

This large series provides the first multi-center insight into the effectiveness of laser therapy in a standard clinical practice setting. The dosing strategy of treating superficial wounds, operative wounds, hot spots and superficial tendon injuries with 3 to $4J/cm^2$ over a large area with good margins was shown to be effective. Similarly, the dosing strategy of treating deep wounds, arthritis, contusions, hip dysplasia and disc disease with higher doses of 6 to $10J/cm^2$ over a large area with good margins was also shown to be effective.

These dosing regimens appeared to be complemented by protocol adjustments for coat and skin color and animal size by the SmartCoat technology in the Companion Therapy lasers, as well as the versatility of the condition-specific treatment heads.

As laser therapy becomes ubiquitous in veterinary practice, a rigorous assessment of its efficacy is critical. In the complete absence of large, multicenter studies, this case series is a significant step toward establishing uniform dosing and technique in the use of this modality in common veterinary practice.

Conclusions

This is the first published uniform multicenter, international case series to assess the effectiveness of any laser therapy technique in veterinary practice. Class IV Companion Therapy Lasers using SmartCoat technology have been clearly demonstrated to empower small animal practices to achieve consistent positive outcomes over a wide range of common clinical conditions.

The effectiveness of Class IV power and dosing strategy were consistent at all study sites. These data provide a foundation for dosing strategy that will inform future work to further establish the efficacy of laser therapy in the small animal veterinary clinic of the future.

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Jason Smith is director of Clinical Affairs at LiteCure LLC. He is focused on the coordination and support of research and clinical activity to better understand the fundamentals and applications of laser therapy.

His research has focused on wound healing and the modulation of the body's response to medical devices. He serves as an ad-hoc reviewer for scientific journals including Lanmuir and Experimental Cell Research and has published many peer-reviewed articles. Clinically, he has designed IDE and post market randomized multicenter clinical trials for a wide range of medical devices.

He holds bachelor's and master's degrees in Materials Science and Engineering from North Carolina State University and a doctorate in biomedical engineering from Duke University.

Table 2

OUTCOME	DOGS	CATS
Excellent	52 (43.3%)	22 (48.9%)
Very good	15 (12.5%)	
Good	48 (40.0%)	20 (44.4%)
Fair	3 (2.5%)	3 (6.7%)
Poor	2 (1.7%)	
Total	120	45

* Pierrefonds Animal Hospital used a 5-point scale.

REFERENCES...

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2. Hashmi et al. Lasers Surg Med. 2010 August ; 42(6): 450-466.

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