

Validation Studies for SunTech Vet BP Technology

Introduction

SunTech's clinical-grade, oscillometric veterinary blood pressure (BP) technology has been used by veterinarians all over the world. SunTech has a history of over 30 years in highly accurate, motion-tolerant BP for human use. The BP experts at SunTech created BP algorithms specific to cat and dog physiology, so SunTech's veterinary products are never just human products re-packaged.

The SunTech Vet BP technology, which is used in the SunTech Vet20, Vet25, and Vet30 monitors, as well as the SunTech Advantage veterinary modules, has been used in validations on both anesthetized dogs and cats. The gold standard in blood pressure measurement is invasive arterial pressure and this was used as the reference in the validation studies. Establishing accuracy of SunTech Vet BP technology as compared to invasive blood pressure is important for veterinarians as it gives a non-invasive measurement option for that parameter. Invasive measurement can be challenging and requires specialized equipment and surgical expertise, especially for cats.

Standards for the validation of non-invasive blood pressure (NIBP) devices were established by the American College of Veterinary Internal Medicine (ACVIM) in 2007¹, with a revision in 2018². Veterinarians should investigate if an oscillometric BP monitor has a validation meeting the ACVIM guidelines when deciding which device to purchase.

The Seven Validation Criteria of the ACVIM Guidelines

The ACVIM guidelines outline seven requirements that must be met by the device being validated.

1. *The mean difference of paired measurement for systolic (SYS) and diastolic (DIA) pressure is ± 10 mmHg or less.*
The average difference between the reference value and the test device value is the bias.
2. *The standard deviation of paired SYS and DIA measurements is 15 mmHg or less.*
Standard deviation indicates how spread out a group of measurements are from the average value. A lower standard deviation indicates higher precision in the measurements.
3. *The correlation between paired measures for SYS and DIA separately is ≥ 0.9 .*
Correlation coefficients measure the strength of a relationship between 2 variables. However, it is possible to have a correlation close to 1 even with considerable bias between the methods.³ As such, there have been questions posed around the appropriateness of using correlation analysis when comparing two techniques that measure the same variable.⁴
4. *50% of measurements for SYS and DIA lie within 10 mmHg of the reference.*
This is a measurement of accuracy of the attained measurements. A higher percent of measurements falling within 10 mmHg indicates closer agreement with the reference and is preferred.
5. *80% of measurements for SYS and DIA lie within 20 mmHg of the reference.*
This is a measurement of accuracy of the attained measurements. A higher percent of measurements falling within 20 mmHg indicates closer agreement with the reference and is preferred.
6. *The study results are accepted for publication in a referred journal.*
7. *The subjects include no fewer than 8 animals for comparison with an intra-arterial reference or 25 animals for comparison with a previously validated indirect device.*
Sample size is critical in validation studies for several reasons. A larger sample size is more representative of the population and places less emphasis on outliers or extreme observations. An under-sized study may produce results that are less useful or significant than a study with a sufficiently large sample size.

SunTech Vet BP in Dogs

In a study published in 2016⁵, SunTech Vet BP technology was validated to all seven criteria defined by the ACVIM. This study was conducted in 20 adult dogs. The results of this study showed that the SunTech Vet BP technology met the ACVIM guidelines for agreement with invasive blood pressure (IBP). The SunTech Vet BP technology also met the Association for the Advancement of Medical Instrumentation (AAMI) guidelines. This study validates SunTech Vet BP technology for use with anesthetized dogs.

SunTech Vet BP in Cats

A study published in 2020⁶ examined the SunTech Vet BP technology's performance in anesthetized cats. In this case, the device used was a SunTech Vet25 veterinary BP monitor. When compared to intra-arterial BP across all validation criteria provided in the ACVIM guidelines, the SunTech technology met all but one (correlation). However, the study highlights that correlation analysis has been criticized as an inappropriate tool for comparing two techniques that measure the same biological parameter. In this study, SunTech Vet BP technology was found to meet the ACVIM guidelines for mean difference of paired measurements, standard deviation, accuracy of measurements, and sample size. This shows high levels of precision and accuracy of this technology in cats when compared to intra-arterial BP.

The authors of the paper recommend that the Vet BP technology be used in clinical settings to monitor arterial blood pressure in anesthetized healthy cats. A common failure point in oscillometric NIBP devices is the rate of successful readings. As noted in

the paper, a non-SunTech oscillometric NIBP device used in another study was only “provided readings in 55% - 81% of attempted measurements”. The authors note that the Vet25 used in this validation study was able to achieve an NIBP measurement with every attempted measurement. This is an advantage of SunTech Vet BP technology that is especially useful in a clinical environment.

How SunTech Vet BP Stacks Up Against the ACVIM Guidelines

	Anesthetized Dogs	Anesthetized Cats
Mean difference < \pm 10 mmHg	✓ SYS – 3.4 mmHg DIA – 2.2 mmHg	✓ SYS – 2.7 mmHg DIA – 0.9 mmHg
Standard deviation < 15 mmHg	✓ SYS – 6.3 mmHg DIA – 4.5 mmHg	✓ SYS – 13 mmHg DIA – 11.9 mmHg
Correlation \geq 0.9	✓ SYS – 0.9 DIA – 1.0	SYS – 0.63 DIA – 0.67
50% of measurements within 10 mmHg	✓	✓
80% of measurements within 20 mmHg	✓	✓
Study accepted for publication	✓	✓
8+ animals	✓ 20 dogs	✓ 30 cats

Are SunTech Vet BP Devices Recommended for Use in Dogs and Cats?

Yes, the SunTech Vet BP devices are recommended for use in both dogs and cats. The blood pressure technology is fully validated in anesthetized dogs and has also been proven to be accurate and precise in cats. This technology was designed for these species in conjunction with a leading veterinary school in the United States and has been used successfully across the globe in the years since its launch. The Vet20, Vet25, and Vet30 BP monitors combine SunTech’s clinical-grade BP technology with an intuitive interface and excellent design.

The portable SunTech Vet20 quickly and easily provides reliable BP measurements on companion animals. The Vet20 quietly performs motion-tolerant, oscillometric BP measurements. The SunTech Vet25 is a rechargeable option to quickly and easily provide blood pressure measurements for wellness exams, spot-checks, and while monitoring companion animals pre- and post-procedure. The touchscreen interface allows users to review and analyze BP data. The SunTech Vet30 builds on the features of the Vet25 by adding two additional measurement parameters: temperature and oxygen saturation (SpO₂). All of SunTech’s Vet BP monitors come with a wide range of BP cuff sizes. SunTech’s veterinary blood pressure cuffs are made from soft, latex-free materials and feature rounded corners and color-coded sizing.

References

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