Non-Invasive Blood Pressure for Mice and Rats

Case Studies

Not all tail-cuff systems are the same!
A “must read” before purchasing any blood pressure measuring device.
“Your tail-cuff technology is a perfect indicator for our compound” - as stated by the Senior Vice President of the Vascular Research Division in one of the leading pharmaceutical companies in the world. A recent drug study utilized large rats to demonstrate that it is possible to inhibit both cathepsin G and chymase with a single molecule. The compound exhibited noteworthy anti-inflammatory activity in rats for glycogen-induced peritonitis and lipopolysaccharide-induced airway inflammation. The study suggested an exciting opportunity in the treatment of asthma and chronic obstructive pulmonary disease. Blood pressure measurements are the secondary end-point in this drug trial. The senior management team insisted on comparing four tail-cuff manufacturers (Visi……., IIT……., Harv……, Kent Scientific), before purchasing a non-invasive blood pressure system. Only Kent Scientific’s volume-based, tail-cuff method provided the required accuracy and reproducibility to be used in the pre-clinical phase of this drug study. - Ref: 254

“My lab has conducted several independent studies and the overall results with your CODA were great. Thanks so much for coming and giving us an excellent training session” - as stated by the Director of the Cardiovascular Disease Department in a prominent pharmaceutical company with R&D facilities in New Jersey, Pennsylvania and California. The company was conducting several drug studies that required very high throughput to meet their preclinical deadlines and significantly improve technician efficiency. One drug study in particular investigated the effect of the deletion of long-form leptin receptor on the progression of atherosclerosis in ApoE-/- mouse ApoE-/-; db/db double knockout mice. Accurate and consistent non-invasive blood pressure (NIBP) measurements were highly desired. The study results demonstrated that type 2 diabetes can accelerate atherogenesis in mice. The mouse model provided insight into the mechanistic link between type 2 diabetes and atherosclerosis as well as a valuable assessment tool for therapeutics. The Kent Scientific’s 12-animal system (CODA 12) was extensively evaluated on C57BL6, 25 gram mice. The volume-based NIBP measurements were compared to telemetry (Data Sciences) for accuracy and consistency. The correlation in blood pressure readings between telemetry and volume pressure recording were 99% in systolic BP and slightly lower in diastolic BP. The Cardiovascular Group now uses the CODA system as their standard for non-invasive blood pressure studies in rodents. Later that year, the Comparative Medicine group purchased a CODA 6 system. - Ref: 256
“The CODA machine was favorably received, the data is remarkable” - as stated by a world-recognized expert in hypertension. This researcher is the Director of the Cardiovascular Department of a renowned university in Kentucky and also consults for numerous pharmaceutical and biotech companies on hypertensive issues. The CV Department has been using (3) three 4-channel tail-cuff systems (Visi…) for several years and was not happy with the accuracy and consistency of the data. After a two-month, side-by-side evaluation comparing the (Visi…) light-based method and the Kent Scientific volume-based method, the department decided to replace all three (Visi…) systems with a CODA 12 system. Now, the Director and his group have a high degree of confidence in their NIBP measurements. The staff, in particular, is extremely pleased with the animal through-put and time savings. The current research study uses medium mice to determine the role that angiotensin II plays in the development of atherosclerosis and abdominal aortic aneurysms. - Ref: 356

A small university in Alabama needed to non-invasively obtain the blood pressure of rats for a long-term study involving omega-3 nutrition. The experiment examined the interactions between methyl mercury (MeHg) and n-3 fatty acids in female Long-Evans rats. The Supervisor of the Anatomy, Physiology and Pharmacology Department could not obtain consistent BP readings with their existing tail-cuff instrument (IIT….). Kent Scientific arranged a product demonstration to validate that the volume pressure recording (VPR) method is superior to their existing photoplethysmography device (IIT....). After reviewing the results of the validation study, the entire department agreed that the VPR method was clearly superior to the light-based method. The researchers were very impressed with the CODA software and the tutorial. The experiment was completed and the findings were consistent with hypothesis that developmental MeHg exposure produced preservative behavior and can unmask MeHg’s effects. The reliability of the blood pressure measurements was particularly beneficial in evaluating the overall study results. - Ref: 371
"The CODA 6 machine is perfectly suited to our needs" - as stated by the Division Head of a leading edge pharmaceutical company with locations in Boston and Southern California. Multiple site studies were being conducted using large rats and 18 gram mice to demonstrate that there is genetic evidence that Lck kinase activity is critical for signaling mediated by the T cell receptor (TCR), thus leading to normal T cell development. The study protocol required blood pressure measurements as a secondary end-point. Also, if possible, an alternative method to telemetry (Data Sciences) was required to avoid surgical implantation. Several light-based NIBP devices (IIT…., AD….,Instr…., and Hatt….) were compared to telemetry and the results were disappointing, especially in the 18 gram mice. The researchers now had serious doubts about the reliability of tail-cuff blood pressure. After one researcher read a recent feature article in Animal Lab News describing the Volume Pressure Recording, Kent Scientific was contacted for a demonstration. A two-day comparison study was conducted and Volume Pressure Recording correlated 99% to telemetry. Currently, the pharmaceutical client is employing two CODA 6 systems at both sites and obtaining accurate and consistent BP measurements without surgical intervention. - Ref: 252

"Kent Scientific has the best and most truthful tail-cuff method" as stated by the Director of Pharmacology of a primary biotech company located in Virginia. The current compound is being tested for the prevention of ischemic liver injury by activation of A2A adenosine receptors during reperfusion to inhibit chemokine induction in tiny C57BL6 mice. In the past, the research group studied large rats using their existing light-based tail-cuff device (IIT….). The current study required blood pressure measurements on mice with diminished tail pulses which resulted in readings that were difficult to obtain and very inconsistent. Reluctantly, the researchers were forced to perform surgery to obtain direct BP measurements. The CODA 6 system was evaluated to determine if using volume pressure recording on mice with diminished tail pulses could resolve their dilemma. Successfully, the Volume Pressure Recording method obtained very consistent and accurate BP measurements on 20 gram mice. The volume-based tail-cuff method does not require the measurement of tail pulses to obtain reliable blood pressure measurements. - Ref: 251

"Volume Pressure Recording correlated perfectly with direct blood pressure. We have tried many highly acclaimed NIBP devices sent to us for trial and none of the devices were satisfactory. Only the CODA worked well in our lab. We found the data quite useful and convincing" - as stated by the Chief of Vascular Surgery in the foremost hospital in Boston. Before evaluating and accepting the reliability of the CODA system, the researchers were forced to use a ultrasound doppler to obtain non-invasive blood pressure measurements. Although the researchers found the doppler to be accurate, this technique was difficult, manual and very time consuming. The current research involved the study of 20 gram mice with bilateral limb and aorta ischemia. The CODA system provided an easy and quick tail-cuff method to accurately measure the blood pressure. - Ref: 255
“We have been very happy that we can get reproducible and precise results and in fact we have already been able to show significant differences between one of our transgenic strains compared with wild type mice. Thanks so much for all of the prompt support for our new blood pressure machine.” - as stated by the Chairperson of the Molecular Cardiology Research Department of an eminent Medical Center in New England. The research group’s focus is the molecular signaling mechanisms and resulting protective effects of two endogenous, vasoprotective molecules: estrogen and nitric oxide. The current study explores the role of estrogen receptors and the genes they regulate in ischemic cardiovascular diseases in small mice. Previously, the researchers were using the 4-channel (Visi…) system and the results were unsatisfactory. The medical center purchased another (Visi…) system based on the manufacturer’s promise that this new model (Visi… 6-Channel) has improved hardware and software; therefore accurate and consistent BP readings would result. The researchers continued to be disappointed and frustrated. Skeptically, the Director contacted Kent Scientific to determine if our volume-based method could produce consistent and accurate BP measurements. After a two-month trial, both the (Visi…) devices were traded-in for the Kent Scientific’s CODA 12 system. The group is now very satisfied and has budgeted for another CODA system next year. - Ref: 357

“We have tried the (Harv…) device and it didn’t work. We used the (Ad…. Instr ...) device, which gave us inconsistent readings. Finally, we bought the (Hatt…. ) instrument which only worked intermittently on rats and doesn’t work on mice. This year, we tried the (Visi…..) system on a trial basis but it was difficult to use and we had trouble obtaining BP measurements. We have a clear desire and need to find a way to avoid vascular cannulation because of the difficulty and the stress to the animal. Kent Scientific provided a CODA system for a trial period and the results were excellent. We are now using the CODA single-channel system quite a bit and have found that it works well in our research model. In particular, the tail volume readout is helpful in determining whether our readings are reliable and has given us insights into the hemodynamic effects of our anesthesia” - as stated by the Head of Surgery of the Pulmonary & Critical Care Division of a well-recognized Medical Center in Seattle. One of their current experiments involves the study of anesthetized C57BL/6 mice on positive-pressure ventilation and then measuring the blood pressure over a 2-3 hour period. The study outcome and the NIBP data were excellent. As a result, a second group of researchers from the Cardiovascular Pathology Department decided to conduct a side-by-side comparison for two months between their existing (Visi…. ) instrument and the CODA 6 system. In conclusion, they decided to replace their (Visi…. ) instrument with a CODA 12 system. Over the next six months, three (3) additional departments purchased CODA systems. - Ref: 355
A ten-year old biotech company in South San Francisco has been studying medium to large rats for the evaluation of potential therapies for inflammatory airway diseases. The current study involves Phosphodiesterase type 4 (PDE {4}) inhibitors as a cause in arteritis/vasculitis of unknown etiology in rats. The Senior Manager of the Drug Discovery Department purchased a NIBP device (IIT…) in 2004 and later purchased another instrument (Visi…) in 2005; but, unfortunately, neither light-based tail-cuff system worked well enough to meet their research requirements. Now, the extremely skeptical manager insisted on a very comprehensive clinical evaluation before he would purchase another tail-cuff system. The proposed evaluation was the following: “Have 3 groups of rats (normotensive, SHR (Spontaneously Hypertensive Rat), and valsartan-treated group). The first two groups will be randomized into two groups which will have some normotensive animals and some with SHRs. They will be evaluated in two separate runs. Once the two separate runs have been completed, the two separate groups will be evaluated to separate the normotensives from the hypertensives. The capabilities of the NIBP system should be able to distinguish between the two groups. Next, we will dose a group of rats with valsartan, an angiotensin receptor blocker, wait a short time and then measure their blood pressures. The dose of valsartan will be one where a noticeable decrease in pressure has been observed in previous studies. So by the end of the day, we will have all the data to make that important decision to purchase another tail-cuff system. We would like to do this soon if at all possible. Please let me know what you think”. “I think this is the best way to evaluate the system, arrive at the ultimate decision and provide the confidence we need to assure ourselves of our investment.” The CODA system performed as expected and the Senior Manager purchased the CODA 6 system. The drug study is near completion and the non-invasive blood pressure measurements derived from Volume Pressure Recording are the primary endpoints in this preclinical trial. - Ref: 415

“I have previously had very little success in using other NIBP monitoring devices in anaesthetized animals” - as stated by the senior researcher in the Neurology Department of one of the most distinguished universities in London, England. Experimentation is performed on awake and anaesthetized mice with spinal cord injuries. The study protocol includes the need to intermittently measure the blood pressure to ensure that the animals are able to feel the pain mechanism model. It is essential to obtain reliable data without causing undue stress to the animals when awake. The CODA 2 system was tested for one (1) week on awake and anaesthetized mice to evaluate the reliability of Volume Pressure Recording. For the first time, the researcher was able to obtain reliable and consistent blood pressure measurements on anaesthetized mice. In addition, the researcher was very pleased with the CODA system’s animal holders since the awake mice exhibited very low levels of stress during the blood pressure measurements. - Ref: 253
At the University of Michigan, the Director of the principal Mouse Core Group in the Midwest surgically implants telemetric transponders (Data Sciences) to obtain blood pressure measurements. In 2005, the researcher published a research paper in the Journal of Hypertension, comparing two light-based tail-cuff manufacturers (Visi.... and IIT......). One device (Visi....) was clearly proven to be inaccurate and inconsistent. The second device (IIT....) was acceptable if used by well-trained technicians. This published paper also refuted the 12 year old validation study for the Visitech System. Serious flaws and discrepancies were uncovered in the data analysis, thus invalidating the 1995 Visitech study. Later in the year, the Mouse Core Group had the opportunity to perform three separate evaluations on Volume Pressure Recording (VPR): (1) comparing to the light-based methods of (IIT.... and Visi....), (2) VPR compared to direct BP readings off the carotid artery, and, (3) compared to telemetry (Data Sciences). The study subjects were C57/BL6, FVB and other strains of mice weighing 25 grams. The VPR method correlated 99% Systolic BP and 93% Diastolic BP compared to telemetry. Equally impressive, the researcher substantiated the fact that Volume Pressure Recording is the only tail-cuff method that actually measures the diastolic blood pressure, not just the calculation (estimation) of diastolic blood pressure. The CODA 6 system is the only tail-cuff method exclusively used in the laboratory. - Ref: 413

The Genetics Department of a major university in San Diego is studying a severe phenotype of a mouse model that will grow no larger than 10 grams. The current research is to determine if Hypoxia-inducible factor-1alpha is a key regulator of metastasis in this transgenic mouse model (HIF-1alpha was conditionally deleted in the mammary epithelium for metastatic breast cancer). The researchers tried several tail-cuff devices (Visi.... & IIT....) but were not able to obtain blood pressure readings since the tail pulse was so weak and almost absent. Volume Pressure Recording (VPR) is pulse independent and does not require the detection of a tail pulse to measure the animal’s blood pressure. The light-based tail-cuff methods require the presence of the tail pulse in order to obtain the blood pressure, thereby limiting their ability to measure small rodents. The CODA 2 system was evaluated to determine if the VPR method was sensitive enough to capture the BP signal. The researchers were very satisfied to see that the VPR method was sensitive enough to obtain consistent and accurate BP measurements. The study results showed that HIF-1alpha is not required for the initiation of breast tumor growth or tumor cell metastasis and the transcriptional activity of HIF-1alpha is a significant positive regulator of tumor progression and metastatic potential. - Ref: 372
One of the top pharmaceutical corporations in the world required a non-invasive blood pressure system that can produce high through-put studies while providing consistent and reliable BP measurements. One component of the current trial was the study of the genetic architecture underlying the plasma high-density lipoprotein cholesterol (HDL) levels in C57BL/6 mouse strains. Previously, the Senior Director of Drug Discovery used a light-based tail-cuff system (Visi....) in another lab and was very unhappy with their “inconsistent inaccurate results.” After contacting numerous Kent Scientific references and conducting a 30-day trial, the director approved the purchase of the CODA 24 system. Kent Scientific’s clinical scientist performed an on-site in-service, installing the equipment and training the entire staff. Hundreds of mice are measured every week. The director was delighted with the high animal through-put and the consistently accurate BP measurements. Volume Pressure Recording is now the only tail-cuff method that is approved by senior management. One year later, the director requested a software change to the CODA system to further improve animal through-put. Upon development and implementation by Kent Scientific, the software revision reduced technician testing time by over 50%; significantly improving the drug trial efficiency. - Ref: 414

The Director of the Molecular Biochemistry Department of an eminent research institute in Canada was extremely dissatisfied with the BP measurements from her existing NIBP instrument (Visi......). The current experiment involves Fibrillin-1 localization in the myocardium and the modulation of its expression in cardiac fibrosis of transgenic mice. After the Director received a recommendation from a well-known researcher at a large pharmaceutical company, the Director agreed to a 30-day trial comparing direct blood pressure and volume pressure recording. Remarkably, the volume-based tail-cuff method obtained NIBP measurements on untrained mice, almost immediately. Over the next 30 days, the comparison results demonstrated excellent correlation to invasive blood pressure readings. The CODA 6 was purchased and a trade-in credit allowance was given for the existing (Visi...) device. The Director is now allocating funds to add another CODA 6 system for next year’s budget. - Ref: 412

“Thanks so much for taking the time to make the visit. We are moving ahead now with data collection and feel quite confident in our results.” - as stated by the Department Head of Nutritional Research Center of the primary university in the Dakotas. The current study uses Sprague-Dawley (S-D) rats with reduced utero-placental perfusion (RUPP) as a model of preeclampsia. The research group compared the Volume Pressure Recording (VPR) measurements to direct blood pressure and was very confident with the almost perfect correlation. VPR measurements were one of the primary endpoints in this study. The research findings supported the link between fetal undernutrition and the development of hypertension later in life in two generations of S-D rat offspring. - Ref: 259
“We decided to buy your non-invasive BP device since my colleague (Dr. C.O.) bought your CODA system. We have been using it extensively over the last couple of years and are very happy with the performance” - as stated by a key researcher in the Department of Anesthesiology of a renowned medical research university in Germany. The current research demonstrated that arterial blood pressure and blood gases can be measured reliably in anaesthetized and artificially ventilated mice using non-invasive technologies. C57BL6 mice were anaesthetized by i.p. injection of midazolam, fentanyl and medetomidin. The mice were intubated and ventilated for 3 hours. End tidal pCO2 was monitored by micro-capnometry. Arterial blood pressure was measured non-invasively using the volume-based, tail-cuff method. Volume Pressure Recording correlated strongly with the invasive arterial blood pressure measured at the external carotid artery \((r=0.99, P<0.001)\) and end tidal pCO2 values correlated very well with arterial blood pCO2 \((r=0.93, P<0.001)\). The overall results indicated that it is possible to reliably measure and control the most relevant physiological parameters in anesthetized mice. In the future, the investigators believe that this type of research utilizing non-invasive blood pressure measurements may help to reduce animal numbers and perform mice experiments under more defined and controlled physiological conditions. - Ref: 257

A major pharmaceutical corporation, headquartered in Sweden with locations throughout the United States, required a reliable method to obtain accurate blood pressure measurements while minimizing the animal’s level of stress. The Global Vice President of Vascular Disease Prevention/Integrative Pharmacology was very concerned about the clinical validation of tail-cuff methods. In the past, the company had negative experiences with the photoplethysmographic tail-cuff devices (IIT…. and Ad…. Instr…..). Additionally, the heating of the animals was a major stress concern. The current study involved the development of imaging techniques to study in vivo vascular morphology and function in atherosclerotic mouse models. Using ultrasound biomicroscopy (UBM), the scientists developed and validated a new imaging protocol to follow lesion progression in atherosclerotic mice. ApoE and LDL receptor double knockout mice (DKO) with various degrees of atherosclerosis and normal control mice were imaged at the level of the ascending aorta. The study protocol called for the use of mice as small as 20 grams. Kent Scientific provided the requested reference publications and customer referrals to satisfy the researcher’s initial concerns. The CODA 6 system was delivered and the Kent Scientific clinical scientist completed a full day on-site installation and clinical training. The entire research team was very impressed and satisfied with the reliability of the Volume Pressure Recording (VPR tail-cuff method) from Kent Scientific. In addition, the VPR tail-cuff method reduced the level of animal stress by requiring minimal warming to elicit thermo-regulation. - Ref: 370
Two surgeons from the Anesthesia & Preoperative Care Department of a well-known university in Northern California are transplanting the liver and lungs of obese Zucker rats and need to intermittently monitor the animal’s blood pressure during surgery. The current project is a collaborative effort of this U.S. institute and an eminent German university. The investigators need to determine if ischemic preconditioning improves the energy state and, therefore, the transplantation survival. The two research groups have tried other tail-cuff manufacturers (Harv... & Hatt...) and were not able to obtain satisfactory blood pressure measurements. Although the animals had extremely low blood pressure, the Volume Pressure Recording (VPR) method from Kent Scientific was able to obtain consistent BP measurements throughout the surgery. Now, both institutes use the CODA system as their vital sign monitor and a standard of care. - Ref: 373

The Director of Pharmacology in a prominent Medical Center in Washington, DC was studying small transgenic mice to determine the cardiovascular consequences of sleep apnea. The research study investigated the effects of intermittent hypoxia (IH) on oxidative stress-induced myocardial damage. C57BL/6 mice were subjected to IH (2 min 6% O2 and 2 min 21% O2) for 8 h/day for 1, 2 and 4 weeks; isolated hearts were then subjected to ischemia/reperfusion. The results demonstrate that IH changes the susceptibility of the heart to oxidative stress in part via alteration of thioredoxin. The study protocol required blood pressure measurements as a secondary endpoint. The researchers wanted to determine if any tail-cuff method could achieve accuracy of 5mmHg or better when compared to direct blood pressure (carotid artery). Three tail-cuff manufacturers (Visi...., IIT...., and Kent Scientific) were evaluated and only the Kent Scientific’s Volume Pressure Recording (VPR) method met the requirement. The VPR method correlated almost 100% with direct blood pressure measurements. Kent Scientific’s technical group was also able to work with the researcher to develop a custom worksheet to record in real-time the direct BP and Volume Pressure Recording measurements simultaneously. - Ref: 379

A five-year old biotech company in California was performing chronic studies on mice for the treatment of inflammatory diseases. The scientists were investigating arachidonic acid as a pathway for therapeutic intervention in a variety of inflammatory diseases and needed blood pressure measurements as a secondary endpoint. Previously, the researchers had negative experiences with two tail-cuff companies (IITC...., Colum....Instr.....) and now were quite skeptical about non-invasive tail-cuff devices. Kent Scientific provided clinical references and participated in a one-month study comparing Volume Pressure Recording (VPR) to direct blood pressure measurements in C57/BL6 mice. The Head of Pharmacology and Preclinical Development Department concluded that the VPR method correlated extremely well with invasive direct BP measurements. The research group is now obtaining dependable and accurate blood pressure measurements using the CODA 6 system. - Ref: 359
“I now have no doubt in the superiority of your system against the competitors” - as stated by the Senior Director of the Cardiovascular Sciences Division of the U.S. government’s National Institute of Health. Six major sections of the Institute are currently using CODA systems on mice and rats in a broad array of research ranging from Aging and Cardiovascular Sciences to MRI Imaging and Anesthesia/Surgical Services. The aim of one study was to longitudinally determine the effect of aging on nociception. An electrical stimulation method was designed to automatically elicit and detect pain-avoiding behavior in mice. Using a novel and noninjurious nociception assay, the authors showed that over the life span of mice, current vocalization threshold to electrical stimuli changes in a U-shaped pattern. The findings support the theory that age-related changes in nociception are curvilinear, and to properly study and treat pain, the age of subjects should be considered. Non-invasive blood pressure measurements were used as a secondary endpoint. Government equipment procurement required competitive bidding and product comparisons. Kent Scientific was one of the few selected manufacturers to be evaluated prior to the final purchase. After a six-week comparison, the CODA system was chosen as a result of fair pricing and superior performance. Over the next three years, the Volume Pressure Recording method became the preferred and standard tail-cuff method throughout this enormous government institute. - Ref: 258

The number one research facility and transgenic mouse breeder/supplier in Maine established a mouse consortium five years ago and chose the only multi-animal NIBP tail-cuff manufacturer (Visi....) available at that time. The researchers were extremely unhappy with the lack of accuracy and lack of dependability of the (Visi....) system. The Director of Drug Discovery stated that the (Visi....) system produces “consistently inaccurate BP readings”. Other staff scientists complained about the (Visi....) system being “time consuming, displaying erroneous BP reading from motion artifact, difficulties in measuring dark-skin mouse strains and tiny mice”. For one of the current studies, the investigation of the intercrosses of inbred mice lines and polygenic inheritance, the Director wanted to evaluate a new type of tail-cuff technology recommended by a colleague. Kent Scientific provided a CODA 12 system on a trial basis and our clinical scientist trained the entire staff for several days. After a long trial period and numerous validation studies, the Volume Pressure Recording (VPR) method was approved for all drug discovery experimentation. Kent Scientific replaced all four (Visi....) systems and the mice through-put more than tripled immediately. Two additional CODA 6 systems were purchased during the following year for different research projects. - Ref: 410
“We are very happy with the CODA 6 and have recommended the CODA system to our colleagues” - as stated by the Director of the Department of Physiology and Respiratory Research in the major Medical Center in Ontario. The researchers have been studying how the regulation of the catecholamine biosynthetic enzymes in mice determines the mechanisms for the development and maintenance of hypertension. Animal stress was a major issue in this study so the researchers wanted to avoid surgery (telemetry and direct blood pressure) but still obtain accurate blood pressure measurements. Three tail-cuff manufacturers were contacted (Visi…., Hatt…. and Kent Scientific) and evaluated over a two-week period. Volume Pressure Recording was the only tail-cuff method that satisfied the Director and her staff. As a result of recommendations from these researchers, three additional CODA systems were purchased by different departments within the next two years. - Ref: 350

“We like the Volume Pressure Recording technology and the recent software enhancements” - as stated by the Director of the Cardiovascular and Metabolic Diseases Division of the world’s largest pharmaceutical company headquartered in Connecticut. The current research involves the study of obese rats and mice to determine if cannabinoid-1 (CB1) receptor plays a role in the regulation of appetitive behavior. Over the past year, the group had tried two tail-cuff methods (Visi…., IIT…) but both devices failed to meet the division’s stringent drug testing standards. In addition, the preclinical requirements called for a high animal through-put. A two-month evaluation of the CODA 6 system clearly confirmed the accuracy of Volume Pressure Recording. The researchers were extremely pleased with the CODA 6 system capabilities to measure the blood pressure of six animals simultaneously. The study outcome indicated that chronic treatment with CB1 antagonists resulted in a sustained reduction in body weight in rodents (5 weeks) and VPR measurements were part of the study protocol. Later in the year, another drug study required specific data analysis and Kent Scientific provided special software enhancements to meet the new requirements of the researchers. - Ref: 351

“I visited one of your customers and she kindly demonstrated the CODA 6 system. She is very happy with the set-up and has not experienced any difficulties” - as stated by the Supervisor of the Clinical Pharmacology Department of a leading research university in London, England. The researchers are studying small mice to identify C-type natriuretic peptide (CNP) as an important endothelium-derived mediator that regulates vascular tone and protects against myocardial ischemia/reperfusion injury. The research group conducted an evaluation comparing our volume-based tail-cuff method to the light-based method (Visi…) over a three-week period to determine the level of accuracy, consistency and reproducibility. The CODA system was chosen as the only method that met these testing criteria. Study results suggested that the endothelial CNP might maintain an anti-atherogenic influence on the blood vessel wall and represent a target for therapeutic intervention in inflammatory cardiovascular disorders. - Ref: 352
The Cardiology Department in Pittsburgh needed to measure the maternal blood pressure of an anesthetized pregnant rat during surgery. The current study requires the measurement of simultaneous ventricular pressure and volume to generate pressure-volume loops. High-resolution ultrasound was used to image the mouse embryo and measure the maternal cardiovascular function during pregnancy. The researchers tried several tail-cuff devices (Visi... & Ad... Instr....) but the animal’s blood pressure was too low and the tail pulse was almost absent. The CODA 2 system was demonstrated and the Volume Pressure Recording method successfully and consistently measured the animal’s extremely low blood pressure throughout the ultrasound procedure. Over the next year, two separate departments in the medical center purchased CODA systems. - Ref: 374

“I want to tell you how much I like the CODA 6 we purchased this summer. We are already using it in two large scale mouse experiments. The data generated is more consistent than that produced by our previous (Visi....) system.” - as stated by the Director of Drug Discovery in the most prestigious research institute with locations in California and Florida. The current study is investigating the role of aldosterone and the renin-angiotensin system in cardiovascular disease associated with diabetes and obesity. The scientists are continuously infusing an experimental drug in medium sized mice and wish to intermittently measure the blood pressure non-invasively. The research group evaluated the CODA 6 system and compared Volume Pressure Recording (VPR) blood pressure measurements to telemetry (Data Sciences). The correlation was excellent and the VPR readings were very consistent. The CODA system helped validate and confirm the efficacy of this new compound. - Ref: 354
The Director of Drug Discovery in a 10-year old biotech company in South San Francisco wanted to use non-invasive blood pressure measurements as an endpoint for a current pre-clinical drug trial. The rat study involved a novel therapeutic method to prevent pathological scarring in fibrotic disorders affecting the major organs, diabetes and surgical procedures. Previously, the research group used a tail-cuff instrument (Visi....) that did not provide consistent or reproducible BP measurements. **The CODA 6 system was tested over a three-month period and provided accurate and consistent blood pressure measurements, allowing the research team to successfully complete the initial phase of this study.** - Ref: 377

A rapidly growing biotech company in Northern California is developing a nuclear receptor drug model and the pre-clinical trial requires the chronic study of C57/BL6 mice. The current study involves a hormone receptor (farnesoid-FXR) thought to be implicated in a variety of metabolic and liver disorders. The Vice President of Drug Discovery wanted to perform the pre-clinical trial in-house rather than through an outside contractor (CRO). The study protocol required blood pressure measurements as part of the “proof of principle” to validate the drug model. Over a two-month period, three NIBP manufacturers (Visi...., IIT...., Kent Scientific) were evaluated to determine which tail-cuff method and instrument was better suited for this study. **The CODA 6 was selected as the most reliable tail-cuff system. The researchers were especially pleased with the ease-of-use of the CODA software.** - Ref: 376

Research scientists from the Integrative Physiology Department of a well-recognized university in Colorado conducted experiments involving the use of exercise therapy on very large rats (900 grams). The rats performed moderate exercise on a treadmill equating to a leisurely stroll by humans. The premise was to prove that low-intensity exercise will significantly delay the onset of congestive heart failure. The blood pressure in these obese rats could not be measured by the lab’s existing tail-cuff device (Visi....). One of the research scientists contacted Kent Scientific at a recent Experimental Biology meeting to determine if Volume Pressure Recording could measure the blood pressure on rats as large as 900 grams. **Kent Scientific’s clinical scientist provided the on-site installation and clinical training for the CODA 6 system. Almost immediately, Volume Pressure Recording was successful in measuring the blood pressure of six 900 gram rats simultaneously.** - Ref: 375
One of the largest international pharmaceutical corporations headquartered in North Carolina required a high through-put non-invasive blood pressure system that could provide dependable blood pressure measurements for a variety of drug studies. Rats and mice were the subjects for a broad range of research in the treatments for asthma, HIV/AIDS, malaria, depression, migraine, diabetes, heart failure, digestive conditions and cancer. One particular study involved obese rats in whole body cholesterol trafficking, absorption and anti-diabetic actions. The Director of Metabolic Research, Biochemical & Analytical Pharmacology evaluated two tail-cuff systems (Visi.... and Kent Scientific) to decide which device would meet the study needs. **The CODA 6 system was chosen as the most accurate and reproducible tail-cuff method.** Within a three-year period, two other departments, Investigative & Cardiac Biology and Musculoskeletal Diseases purchased CODA 6 systems as a result of the **high animal through-put.** The above study revealed additional problems associated with current synthetic liver X receptors (LXR) agonists and emphasized the importance of profiling compounds in preclinical species with a more human-like LXR response and lipoprotein metabolism. - Ref: 378

A research veterinarian managing the Veterinary Population Medicine Department of a prominent Minnesota university was conducting chronic cardio-toxicology studies on large pregnant rats. The current project was on gender susceptibility to a cardiotoxic chemotherapy drug (doxorubicin) and the interaction of the toxic and genetically programmed cardiovascular disease. The existing 4-channel NIBP instrument (Visi....) could not produce accurate blood pressure readings on their large rats and the animal platform did not accommodate the animals comfortably. **Kent Scientific’s clinical scientist successfully demonstrated the CODA 6 system's ability to accurately and consistently measure six large rats simultaneously.** Volume Pressure Recording tail-cuff BP measurements were the secondary endpoint in this study. - Ref: 411

“The process of ordering this system from your company has been such a wonderful and enjoyable experience for me, which started from a mutual trust in doing business.” - as stated by the Supervisor of the Department of Health Service in New York. The researchers are studying Null mice to determine if acetaminophen overdose causes toxicity in liver and extrahepatic tissues. Previously, the researchers were using a homemade NIBP device consisting of a piezoelectric sensor with a chart recorder to capture the blood pressure readings. The present study required the blood pressure data to be automatically recorded, analyzed and archived in order to submit for publication. The CODA 2 system exceeded all of the study’s data processing requirements. **The researcher was particularly pleased with accuracy and consistency of the Volume Pressure Recording (VPR) tail-cuff method.** Initial study results indicated that acetaminophen toxicity in the lung, kidney, and lateral nasal glands is at least partly caused by liver-derived acetaminophen metabolites. - Ref: 358