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BALAI BESAR PELATIHAN KESEHATAN HEWAN

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42. Prediction and optimization of slaughter weight in meat-type quails using artificial neural network modeling/ Jahan, Marzieh; Maghsoudi, Ali; Rokouei, Mohammad; Faraji-Arough, Hadi. Poultry Science. ISSN:0032-5791 (2019) v. p.Poultry Science

DOI: 10.1016/j.psj.2019.10.072

Link: <http://www.sciencedirect.com/science/article/pii/S0032579119577884>

Abstract: Carcass yield of meat-type quails is strongly correlated with the weight of the birds at slaughter (slaughter weight [SW]; body weight at 45 D of age). Moreover, prediction of superior animals for SW at the earlier stages of the rearing period is favorable for producers. Therefore, the aim of the present study was to predict and optimize SW of Japanese quails based on their early growth performances, sex, and egg weight as predictors through artificial neural network (ANN) modeling. To construct the ANN model a feed-forward multilayer perceptron neural network structure was used. Moreover, sensitivity analysis was used to arrange the predictors in the ANN model(s) according to their predictive importance too. In addition, the optimization process was conducted to determine the optimum values for the input variables to yield maximum SW. The best-fitted network on input data to predict SW in Japanese quails was determined with 7 neurons in the input layer, 11 neurons in the hidden layer, and one neuron in the output layer. The coefficient of determination (R²) was 0.9404, 0.9359, and 0.9223 for training, validation, and testing phases, respectively. For the corresponding phases, SEM were also 51.8854, 52.2764, and 55.2572, respectively. According to sensitivity analysis, the most important input variable for prediction of SW was body weight at 20 D of age (BW20), whereas the less important input variables were weight of the birds at hatch and body weight at 5 D of age. The results of the neural network optimization indicated that all the input variables, except for BW20, were very similar but slightly higher than mean values (μ for each input variable). The results of this study suggest that the ANN provides a practical approach to predict the final body weight (SW) of Japanese quails based on early performances. Moreover, phenotypic selection for higher values of early growth traits did not ensure the achievement of maximum SW, except for BW20.

Keyword: correlation; artificial intelligence; sensitivity analysis; Japanese quail

43. Neurofunctional test batteries in safety pharmacology – Current and emerging considerations for the drug development process/ Jackson, Samuel J.; Authier, Simon; Brohmann, Henning; Goody, Susan M.G.; Jones, David; Prior, Helen; Rosch, Anke; Traebert, Martin; Tse, Karen; Valentin, Jean Pierre; Milne, Aileen. Journal of Pharmacological and Toxicological Methods. ISSN:1056-8719 (2019) v.100 p.106602Journal of Pharmacological and Toxicological Methods

DOI: 10.1016/j.vascn.2019.106602

Link: <http://www.sciencedirect.com/science/article/pii/S105687191930084X>

Abstract: Regulatory guidelines recommend specialised safety pharmacology assessments in animals to characterise drug-induced effects on the central nervous system (CNS) prior to first-in-human trials, including the functional observational battery or Irwin test (here collectively termed neurofunctional assessments). These assessments effectively detect overtly neurotoxic drugs; however, the suitability of the in vivo assessments to readily detect more subtle drug effects on the nervous system has been questioned. A survey was formulated by an international expert working group convened by the (NC3Rs) to capture practice in CNS neurofunctional assessment tests and opinions on the perceived impact of in vivo test battery endpoints. Impact was defined as “the impact of measures alone/in combination on decision making in drug development or candidate selection when using the neurofunctional

assessment". The results demonstrate that rodents are predominantly used for small molecule assessments, whereas non-rodents are frequently used to test biotherapeutics. Practice varied between respondents in terms of experimental design. Subsets of test battery endpoints were consistently considered highly impactful (e.g. convulsions, stereotypic behaviors); however, the perceived impact level of other endpoints varied depending whether drugs were designed for CNS targets. Many endpoints were considered to have no or minimal impact, whereas a subset of endpoints in CNS test batteries appears more impactful than others. A critical evaluation is required to assess whether the translational value of CNS in vivo safety pharmacology assessments could be increased by modifying or augmenting standard CNS test batteries. A revised approach to CNS safety assessment has the potential to reduce animal numbers without compromising patient safety.

Keyword: Animal; Reduction; Central Nervous System; Functional observational battery; Irwin test; Methods; Neurofunctional assessment; Patient safety; Safety pharmacology; Test battery endpoints

44. Effects of early postnatal MK-801 treatment on behavioral properties in rats: Differences according to treatment schedule/ **Kawabe, Kouichi; Miyamoto, Eri.** Behavioural Brain Research. ISSN:0166-4328 (2019) v.370 p.111926 Behavioural Brain Research

DOI: 10.1016/j.bbr.2019.111926

Link: <http://www.sciencedirect.com/science/article/pii/S0166432819301111>

Abstract: It has been proposed that animals administered early postnatal NMDA (N-methyl-d-aspartate) glutamate receptor antagonists represent a model of schizophrenia; however, drug treatment schedules remain quite different among these animal studies. In this study, we compared the behavioral effects of long-term (14-day) and short-term (5-day) early postnatal treatment of the NMDA receptor antagonist MK-801 (dizocilpine; 5-methyl-10,11-dihydro-5H-dibenzo[a,d]-cyclohepten-5,10-imine). In addition, different drug treatment periods were applied to the short-term treatment study in order to determine the critical developmental period of drug effects. For experiment 1, rats were treated with MK-801 (0.2 or 0.4 mg/kg, twice daily) during postnatal days (PNDs) 7–20. For experiment 2, MK-801 (0.2 mg/kg, twice daily) was administered during the periods of PNDs 7–11, 12–16, and 17–21. In adulthood, several behavioral tests, including prepulse inhibition, open-field, and spontaneous alternation tests, were performed in experiments 1 and 2. The delayed nonmatching-to-position task was also conducted in experiment 2 on separate rats treated for 5 days in the same manner. Our results indicated that the 14-day MK-801 treatment inhibited the prepulse inhibition and decreased immobility in the forced-swim test, whereas the 5-day MK-801 treatment induced only slight behavioral effects. Collectively, our findings suggest that long-term early postnatal treatment with an NMDA receptor antagonist may be detrimental to some behavioral functions, such as sensorimotor gating and stress coping; however, treatment for longer periods is needed to elicit detrimental effects.

Keyword: Rats; Animal model of schizophrenia; Behavioral testing; Early postnatal treatment; NMDA receptors; Treatment schedule

45. An expandable one-way-valve device for chest wound treatment: Evaluation of open pneumothorax in a canine model/ **Yang, Weijin; Zhou, Youxu; Qiu, Jianshen; Tao, Chaochao; Wu, Weihang; Lin, Nan; Yang, Chao; Zhang, Ji; Zhang, Hongwen; Wang, Yu.** Asian Journal of Surgery. ISSN:1015-9584 (2019) v. p.Asian Journal of Surgery

DOI: 10.1016/j.asjsur.2019.10.013

Link: <http://www.sciencedirect.com/science/article/pii/S1015958419308310>

Abstract: Background/objective Thoracic injuries commonly occur after blunt or penetrating trauma, leading to a blowing wound. For thoracic damage control in emergency, we evaluated a novel chest wound treatment device manufactured using expandable material with a one-way valve, and compared it with closed thoracic drainage for first-line treatment of traumatic pneumothorax in a canine model. Methods Twenty beagle dogs (10 males and 10 females) were randomly and equally divided into two groups. After arteriovenous catheterization, an open pneumothorax model was established in the beagle dog using a minimally invasive procedure. The experimental group was treated using our test device, while the control group was treated by closed thoracic drainage. Animal survival, oxygen saturation (SO₂), oxygen pressure (PO₂), and changes in chest radiograph with reference to open pneumothorax before and after intervention were recorded at 30, 60, and 120 min. Results After a 24-h experimental period, all animals survived. The control group recovered more quickly than the experimental group at 30 min post-trauma. However, the indices were close to normal 120 min after the test device was inserted. During the puncture, chest-wall hemorrhage was stopped by using the device, whereas the control group experienced continual errhysis. The lung had almost re-expanded at the end of the experiment in both groups. The effect of pulmonary re-expansion in the control group was better than that in the experimental group at 120 min. Conclusion The novel expandable one-way valve device is a safe and useful tool for the treatment of open chest trauma in emergency based on our animal experiment.

Keyword: Trauma; Expandable device; Pneumothorax

46. Neonatal exposure to furan alters the development of reproductive systems in adult male Sprague Dawley rats/ **Rehman, Humaira; Ullah, Imdad; David, Mehwish; Ullah, Asad; Jahan, Sarwat.** Food and Chemical Toxicology. ISSN:0278-6915 (2019) v.130 p.231-241 Food and Chemical Toxicology

DOI: 10.1016/j.fct.2019.05.020

Link: <http://www.sciencedirect.com/science/article/pii/S027869151930287X>

Abstract: Furan is a colorless toxic organic compound that is produced during thermal degradation of natural food constituents, and is present in various processed foods such as coffee and processed baby foods. The present study investigated the endocrine disrupting potential of furan in Sprague Dawley male pups. On postnatal day 0 (PND 0), pups were divided into five groups. The control group received subcutaneous injections of corn oil (50 μ L), while the treated groups were injected with one of four concentrations of furan (1, 5, 10 and 20 mg kg⁻¹ d⁻¹ in 50 μ L corn oil) from PND 1 to PND 10. Our results reveal significant physiological changes in groups receiving the two highest doses of furan (10 and 20 mg kg⁻¹ d⁻¹). Fertility was decreased in high dose groups, as evidenced by lower daily sperm production (DSP) and epididymis sperm counts, and dose-dependent histological alterations in the testes. High dose groups showed significant reductions in plasma concentrations of testosterone, LH and GH, while plasma cortisol and final body weight was increased compared to the control group. The results suggest that neonatal exposure to high concentrations of furan cause structural and endocrine alterations in male neonatal rats, compromising fertility.

Keyword: Cortisol; Histology; Furan; Neonatal study; Reproductive hormones; Sperm count

47. Bayesian estimation of herd-level prevalence and risk factors associated with BoHV-1 infection in cattle herds in the State of Paraíba, Brazil/ **Fernandes, Leíse Gomes; Denwood, Matthew James; de Sousa Américo Batista Santos,**

Carolina; Alves, Clebert José; Pituco, Edviges Maristela; de Campos Nogueira Romaldini, Adriana Hellmeister; De Stefano, Eliana; Nielsen, Søren Saxmose; de Azevedo, Sérgio Sa. Preventive Veterinary Medicine. ISSN:0167-5877 (2019) v.169 p.104705 Preventive Veterinary Medicine

DOI: 10.1016/j.prevetmed.2019.104705

Link: <http://www.sciencedirect.com/science/article/pii/S0167587718306408>

Abstract: A cross-sectional study was carried out to estimate the animal- and herd-level prevalence of bovine herpesvirus 1 (BoHV-1) infection in cattle in the State of Paraíba, and to identify risk factors associated with herd-level infection. The state was divided into three sampling strata, and for each stratum, the prevalence of herds infected with BoHV-1 was estimated through a two-stage sampling survey carried out from September 2012 to January 2013. In total, 2443 animals were sampled from 478 herds. A virus-neutralization test was used for BoHV-1 antibody detection. A Bayesian latent-class model was used to describe the data, taking into account imperfect diagnostic test characteristics and the non-independence of test results from animals within the same herd, and using a dynamic within-model risk factor selection method based on indicator variable selection. The adjusted herd-level prevalence was estimated to be 84% (95% CI: 80–88%) for the State of Paraíba, and the animal-level prevalence was estimated to be 73% (95% CI: 66–84%). Only five of the available risk factors were used by the model, with the three most influential being disposal of aborted fetuses (3.78, 95% CI: 1.11–13.85), sharing resources with other farms (3.0, 95% CI: 1.1–8.6), and a herd size of > 23 animals (2.5, 95% CI: 1.1–6.0). Our findings suggest that the animal- and herd-level seroprevalence of BoHV-1 infection in the State of Paraíba is high. While some risk factors such as herd size and sharing resources were identified as risk factors for BoHV-1 infection, these risk factors are initially likely to be of only minor relevance in a control programme due to the extremely high prevalence of infected farms. However, the results are relevant to the risk of reintroduction of disease on farms that have previously eradicated the disease.

Keyword: Epidemiology; Risk factors; Bayesian analysis; Herpesvirus; Northeastern Brazil

48. Clinical presentation of FMD virus SAT1 infections in experimentally challenged indigenous South African goats/ Lazarus, David D.; Mutowembwa, Paidamoyo B.; Sirdar, Mohamed M.; Rametse, Thapelo M.; Heath, Livio; Opperman, Pamela A.; Burroughs, Richard E.J.; Fosgate, Geoffrey T.. Small Ruminant Research. ISSN:0921-4488 (2019) v.180 p.15-20 Small Ruminant Research

DOI: 10.1016/j.smallrumres.2019.09.014

Link: <http://www.sciencedirect.com/science/article/pii/S0921448819301750>

Abstract: Foot-and-mouth disease (FMD) is a transboundary animal disease that has a major impact on livestock production and trade. Foot-and-mouth disease virus (FMDV) is a single-stranded RNA virus that infects cloven-hoofed livestock and wildlife. The susceptibility of South African indigenous goats to FMDV Southern African Territories 1 (SAT1) was investigated after experimental challenge with a mixed SAT1 virus pool. In this study, we present the clinical manifestation of FMDV in five naive goats challenged via the intra-dermolingual route with 104.57 50% tissue culture infective dose (TCID₅₀) FMDV virus pool containing SAT1 SAR/8/10, SAR/10/10 and SAR/21/10. The clinical responses of two vaccinated unchallenged goats maintained as in-contacts are also presented. Clinical scoring of FMDV infection and daily rectal temperatures were recorded and temperatures ≥40 °C were defined as fever. All five challenged goats developed fever within 48 h post challenge with a median fever duration of 5 days. The two unchallenged goats developed fever at 5 and 9 days post-contact with FMD lesions appearing at 4 and 8 days post-contact. Additional clinical signs observed included nasal discharge, ulcerative oral mucosal lesions of the lip and

ulcerative interdigital cleft lesions. The pooled FMDV SAT1 infection caused mild clinical signs and natural transmission to reduced-dose vaccinated in-contact indigenous South African goats occurred.

Keyword: Infection; Goats; Clinical; Experimental; Foot-and-mouth disease

49. NPY and NPY receptors in the central control of feeding and interactions with CART and MC4R in Siberian sturgeon/ **Yuan, Dengyue; Gao, Yundi; Zhang, Xin; Wang, Bin; Chen, Hu; Wu, Yuanbing; Chen, Defang; Wang, Zhijian; Li, Zhiqiong.** General and Comparative Endocrinology. ISSN:0016-6480 (2019) v.284 p.113239General and Comparative Endocrinology

DOI: 10.1016/j.ygcen.2019.113239

Link: <http://www.sciencedirect.com/science/article/pii/S0016648018307020>

Abstract: Neuropeptide Y (NPY) is the most powerful central neuropeptide implicated in feeding regulation via its receptors. Understanding the role of NPY system is critical to elucidate animal feeding regulation. Unlike mammal, the possible mechanisms of NPY system in the food intake of teleost fish are mostly unknown. Therefore, we investigated the regulatory mechanism of NPY and NPY receptors in Siberian sturgeon. In this study, we cloned the cDNA encoding NPY, and assessed the effects of different energy status on npy mRNAs abundance. The expression of npy was decreased in the brain after feeding 1 and 3 h. Besides, the expression of npy was increased after fasting within 15 days, while exhibiting significant decrease after refeeding. In order to further characterize the role of NPY receptor in fish, we performed acute intraperitoneal (i.p.) injection of NPY Y1 and Y2 receptor agonists, which is [Leu 31, Pro 34] NPY and NPY13-36 respectively. The results showed that the food intake of Siberian sturgeon was increased within 30 mins after injection of both Y1 and Y2 receptor agonist. To explore the relationship between NPY, NPY receptors and another appetite peptides, we examined the level of npy, cocaine- and amphetamine-regulated transcript (cart) and melanocortin-4 receptor (mc4r) by injected Y1 and Y2 receptor agonist. The results suggested that cart expression was regulated by NPY which acts on Y1 receptor or Y2 receptor. While mc4r expression just was mediated by NPY and Y1 receptor.

Keyword: CART; Feeding regulation; MC4R; NPY; NPY receptors

50. A method for predicting the success of Pulsinelli's four-vessel occlusion rat model by LDF monitoring of cerebral blood flow decline/ **Wang, Wenzhu; Liu, Xu; Lu, Haitao; Liu, Lixu; Wang, Yunlei; Yu, Yan; Zhang, Tong.** Journal of Neuroscience Methods. ISSN:0165-0270 (2019) v.328 p.108439Journal of Neuroscience Methods

DOI: 10.1016/j.jneumeth.2019.108439

Link: <http://www.sciencedirect.com/science/article/pii/S0165027019302961>

Abstract: Background Since the electrocoagulation of the bilateral vertebral artery in the Pulsinelli's four-vessel occlusion method must rely on the experimental experience of the researchers, it has no objective quantitative guidance. The high mortality or insufficient brain injury in the animals occur early in the experiment, requiring more animals to account for those not suitable. New method In this study, Laser Doppler flowmetry (LDF) was used to monitor the decline in blood flow during electrocoagulation in rats to control the degree of brain injury. Results Rats were divided into the sham-operated, mild electrocoagulation, moderate electrocoagulation and severe electrocoagulation groups. In this three electrocoagulation groups, the decline in cerebral blood flow of rats was

26% ± 7%, 44% ± 14% and 69% ± 7% and the corresponding mortality rates were 0%, 33% and 100%, respectively. Rats in the moderate electrocoagulation group, which indicated that the model was successful, had a low mortality rate, showed a high degree of brain injury. Comparison with existing methods The position of the vertebral artery cannot be directly visualized and the degree of cerebral ischemia can only be adjudicated by the experimental experience of the researcher, with no objective guideline by observation. We used LDF to monitor the decline in blood flow during and after electrocoagulation, allowing us to effectively control the degree of cerebral ischemia and thus the mortality of animals. Conclusions With the addition of LDF monitoring, Pulsinelli's four-vessel occlusion can be used as a stable and reliable model for global cerebral ischemiareperfusion injury.

Keyword: Cerebral blood flow decline; Global cerebral ischemia-reperfusion injury; Laser Doppler flowmetry; Pulsinelli's four-vessel occlusion method

51. Changes over time in the electrically evoked compound action potential (ECAP) interphase gap (IPG) effect following cochlear implantation in Guinea pigs/ **Schvartz-Leyzac, Kara C.; Colesa, Deborah J.; Buswinka, Christopher J.; Swiderski, Donald L.; Raphael, Yehoash; Pfingst, Bryan E.** Hearing Research. ISSN:0378-5955 (2019) v.383 p.107809Hearing Research

DOI: 10.1016/j.heares.2019.107809

Link: <http://www.sciencedirect.com/science/article/pii/S0378595519301765>

Abstract: The electrically-evoked compound action potential (ECAP) is correlated with spiral ganglion neuron (SGN) density in cochlear implanted animals. In a previous study, we showed that ECAP amplitude growth function (AGF) linear slopes for stimuli with a constant interphase gap (IPG) changed significantly over time following implantation. Related studies have also shown that 1) IPG sensitivity for ECAP measures ("IPG Effect") is related to SGN density in animals and 2) the ECAP IPG Effect is related to speech recognition performance in humans with cochlear implants. The current study examined how the ECAP IPG Effect changed following cochlear implantation in four non-deafened guinea pigs with residual inner hair cells (IHCs) and 5 deafened, neurotrophin-treated guinea pigs. Simple impedances were measured on the same days as the ECAP measures. Generally, non-deafened implanted animals with higher SGN survival demonstrated higher ECAP AGF linear slope and peak amplitude values than the deafened, implanted guinea pigs. The ECAP IPG Effect for the AGF slopes and peak amplitudes was also larger in the hearing animals. The N1 latencies for a constant IPG were not different between groups, but the N1 latency IPG Effect was smaller in the non-deafened, implanted animals. Similar to previously reported results, ECAP measures using a fixed or changing IPG required as many as three months after implantation before a stable point could be calculated, but this was dependent on the animal and condition. For all ECAP measures most animals showed greater variance in the first 30 days post-implantation. Post-implantation changes in ECAPs and impedances were not correlated with one another. Results from this study are helpful for estimating the mechanisms underlying ECAP characteristics and have implications for clinical application of the ECAP measures in long-term human cochlear implant recipients. Specifically, these measures could help to monitor neural health over a period of time, or during a time of stability these measures could be used to help select electrode sites for activation in clinical programming.

Keyword: Auditory prosthesis; Cochlear implant; ECAP; Guinea pig; Neural health

52. Effects of benzalkonium chloride on cell viability, inflammatory response, and oxidative stress of human alveolar epithelial cells cultured in a dynamic culture condition/ **Jeon, Haejun; Kim, Dongjoo; Yoo, Jean; Kwon, Soonjo.** Toxicology in Vitro. ISSN:0887-2333 (2019) v.59 p.221-227Toxicology in Vitro

DOI: 10.1016/j.tiv.2019.04.027

Link: <http://www.sciencedirect.com/science/article/pii/S0887233318305162>

Abstract: Recently, the importance of inhalation toxicity assessment increased due to recent humidifier disinfectant-associated deaths in children. Benzalkonium chloride (BAC) is currently used as a cationic surfactant and germicide in food industry processing lines and as a hand sanitizer. Animal models are mainly used as a method of evaluating the inhalation toxicity of a hazardous substance, but that approach requires considerable amounts of time and cost. As a replacement for animal experiments, in vitro cell culture can be used to assess toxicity. However, such culture does not reflect the natural microenvironment of the lung, particularly its dynamic nature. In this study, we simulated normal breathing levels (tidal volume 10%, 0.2 Hz) through surface elongation of an elastic membrane in a dynamic culture system. The low-cost dynamic system provided easy control of breathing rate during lung cell culture. We assessed the toxicity using different concentrations of BAC (0, 2, 5, 10, 20, and 40 µg/mL) under static and dynamic culture conditions. Following 24 h of exposure to BAC, cellular metabolic activity, cell membrane integrity, interleukin-8 (IL-8) and reactive oxygen species (ROS) levels, and the total amount of protein in cells were analyzed. Our results showed that significant differences in cellular metabolic activity, as well as IL-8 and ROS profiles, between static and dynamic cell growth conditions, following BAC exposure.

Keyword: Cytotoxicity; Alternatives to animal testing; Disinfectant; Dynamic culture; Inflammatory response

53. Dairy farm soil presents distinct microbiota and varied prevalence of antibiotic resistance across housing areas/ **Liu, Jinxin; Zhao, Zhe; Avillan, Johannetsy J.; Call, Douglas R.; Davis, Margaret; Sischo, William M.; Zhang, Anyun.** Environmental Pollution. ISSN:0269-7491 (2019) v.254 p.113058Environmental Pollution

DOI: 10.1016/j.envpol.2019.113058

Link: <http://www.sciencedirect.com/science/article/pii/S0269749119326363>

Abstract: Dairy cattle of different ages experience different living conditions and varied frequency of antibiotic administration that likely influence the distribution of microbiome and resistome in ways that reflect different risks of microbial transmission. To assess the degree of variance in these distributions, fecal and soil samples were collected from six distinct housing areas on commercial dairy farms (n = 7) in Washington State. 16S rRNA gene sequencing indicated that the microbiota differed between different on-farm locations in feces and soil, and in both cases, the microbiota of dairy calves was often distinct from others (P < 0.05). Thirty-two specific antibiotic resistance genes (ARGs) were widely distributed on dairies, of which several clinically relevant ARGs (including cfr, cfrB, and oprA) were identified for the first time at U.S. dairies. Overall, ARGs were observed more frequently in feces and soil from dairy calves and heifers than from hospital, fresh, lactation and dry pens. Droplet-digital PCR demonstrated that the absolute abundance of floR varied greatly across housing areas and this gene was enriched the most in calves and heifers. Furthermore, in an extended analysis with 14 dairies, environmental soils in calf pens had the most antibiotic-resistant *Escherichia coli* followed by heifer and hospital pens. All soil *E. coli* isolates (n = 1,905) are resistant to at least 4 different antibiotics, and the PFGE analysis indicated that florfenicol-resistant *E. coli* is probably shared across geographically-separated farms. This study identified a discrete but predictable distribution of antibiotic resistance genes and organisms, which is important for designing mitigation for higher risk areas on dairy farms.

Keyword: Antibiotic resistance; Calf; Soil; Dairy farm; Discrete distribution; Housing areas

54. Effect of feeding hydroponic barley sprouts to sheep on feed intake, nutrient digestibility, nitrogen retention, rumen fermentation and ruminal enzymes activity/ **Farghaly, Mohsen M.; Abdullah, Mahmoud A.M.; Youssef, Ibrahim M.I.; Abdel-Rahim, Ismail R.; Abouelezz, Khaled.** Livestock Science. ISSN:1871-1413 (2019) v.228 p.31-37Livestock Science

DOI: 10.1016/j.livsci.2019.07.022

Link: <http://www.sciencedirect.com/science/article/pii/S1871141319301684>

Abstract: This study was conducted to evaluate the effect of feeding hydroponic barley sprouts to sheep on dry matter intake, nutrient digestibility, nitrogen balance, rumen fermentation parameters and ruminal enzymes activity. The barley sprouts were prepared in a hydroponic sprouting unit under controlled environment. Barley grains were first washed, soaked for one day using tap water, and then covered with a wet towel for another one day for germination. Thereafter, they were spread out in trays and were irrigated three times daily by tap water. The trays contained green fodder were removed after 8 days and the harvested carpets were exposed to air ventilation, then weighed and shredded to small pieces before feeding to the animals. Twenty mature rams (50 ± 1.30 kg bw) were randomly distributed into four groups, each with five rams. The rams in group 1 and 2 were fed on Egyptian clover and hydroponic barley sprouts only, respectively, while the animals in group 3 and 4 were offered the same forage sources used in previous groups but with supplying a concentrate mixture. The experiment lasted for three weeks. It was found that feeding of sprouted barley alone reduced total DM intake by about 61.5% than that of the clover alone, but this effect was ameliorated when fed with the concentrate. However, the digestibility of different nutrients was increased in sprouted barley diet by an average of 10.0% compared to the clover. The nitrogen retention % was similar in rams fed barely sprouts or clover without concentrate. Total volatile fatty acids and propionate production was higher by 18.5% and 8.31%, respectively, in rumen of rams fed the sprouts alone or with concentrate than the clover alone. In addition, feeding of barley sprouts increased the total rumen protozoa count by about 31.3% and most of ruminal enzyme activities (45.0, 9.0 and 23.2% for amylase, cellulose and protease, respectively) compared to the clover. Providing the concentrate with sprouted barley or clover improved the nutrients digestibility (by about 14.0%) and nitrogen retention (by 46.0%) as well as amylase (by 60.0%) and urease (by 15.0%) activity in comparison to feeding of these ingredients alone. In conclusion, feeding of barley sprouts alone to sheep reduced the DM intake, however, it can improve the nutrients digestibility, rumen fermentation and ruminal enzyme activities. Moreover, use of sprouted barley in sheep diets could result in better digestibility and fermentation results than the clover. Feeding of concentrate with sprouted barley increased its positive effect on nutrients digestibility and rumen fermentation and improved the total DM intake. Thus, it can be recommended to feed the hydroponic barley sprouts with the concentrate to obtain an optimal DM intake as well as a high animal performance.

Keyword: Sheep; Rumen fermentation; Nutrient digestibility; Egyptian clover; Enzymes activity; Sprouted barely

55. ANAVEX® 2-73 (blarcamesine), a Sigma-1 receptor agonist, ameliorates neurologic impairments in a mouse model of Rett syndrome/ **Kaufmann, Walter E.; Sprouse, Jeffrey; Rebowe, Nell; Hanania, Taleen; Klamer, Daniel; Missling, Christopher U..** Pharmacology Biochemistry and Behavior. ISSN:0091-3057 (2019) v.187 p.172796Pharmacology Biochemistry and Behavior

DOI: 10.1016/j.pbb.2019.172796

Link: <http://www.sciencedirect.com/science/article/pii/S0091305719302515>

Abstract: Rett syndrome (RTT) is a severe neurodevelopmental disorder that is associated in most cases with mutations in the transcriptional regulator MECP2. At present, there are no effective treatments for the disorder. Despite recent advances in RTT genetics and neurobiology, most drug development programs have focused on compounds targeting the IGF-1 pathway and no pivotal trial has been completed as yet. Thus, testing novel drugs that can ameliorate RTT's clinical manifestations is a high priority. ANAVEX2-73 (blarcamesine) is a Sigma-1 receptor agonist and muscarinic receptor modulator with a strong safety record and preliminary evidence of efficacy in patients with Alzheimer's disease. Its role in calcium homeostasis and mitochondrial function, cellular functions that underlie pathological processes and compensatory mechanisms in RTT, makes blarcamesine an intriguing drug candidate for this disorder. Mice deficient in MeCP2 have a range of physiological and neurological abnormalities that mimic the human syndrome. We tested blarcamesine in female heterozygous mice carrying one null allele of *Mecp2* (HET) using a two-tier approach, with age-appropriate tests. Administration of the drug to younger and older adult mice resulted in improvement in multiple motor, sensory, and autonomic phenotypes of relevance to RTT. The latter included motor coordination and balance, acoustic and visual responses, hindlimb clasping, and apnea in expiration. In line with previous animal and human studies, blarcamesine also showed a good safety profile in this mouse model of RTT. Clinical studies in RTT with blarcamesine are ongoing.

Keyword: Animal models; Rett syndrome; Behavioral screening; Drug screening; Mecp2 deficiency; Sigma-1 receptor

56. Incidence, characteristics and geographical distributions of canine and human non-Hodgkin's lymphoma in the Porto region (North West Portugal)/ **Pinello, K.C.; Niza-Ribeiro, J.; Fonseca, L.; de Matos, A.J.** The Veterinary Journal. ISSN:1090-0233 (2019) v.245 p.70-76The Veterinary Journal

DOI: 10.1016/j.tvjl.2019.01.003

Link: <http://www.sciencedirect.com/science/article/pii/S1090023319300024>

Abstract: Lymphoma is one of the most common neoplasms in dogs and it is one of the top five causes of cancer-related deaths, similar to human lymphoma. Companion animal epidemiological studies define dogs as sentinels of potential risk factors for human health, mainly due to shared environments, shorter disease latencies, and spontaneous disease. The aims of this study were to describe human and canine epidemiologic features of non-Hodgkin's lymphoma (NHL) and their similarities, and to investigate a possible geographical association in the incidence risks in the Greater Porto area, in north-western Portugal. The postal codes of human NHL patients diagnosed between 2005 and 2010 residing in the Greater Porto, Portugal, were obtained from North and Central Region Cancer Registries of Portugal. Available data from dogs diagnosed with lymphoma between 2005 and 2016 from several veterinary centres were also collected. Descriptive epidemiology, mapping cases, and age-standardised risks of NHL incidence (ASR) were determined for both species. The results showed a higher risk ($P < 0.05$) of NHL in men (ASR men: 18.1 cases/100,000 inhabitants; women: 14.2 cases/100,000 inhabitants) and in male dogs (ASR males: 82 cases/100,000 dogs; females: 70 cases/100,000 dogs). The geographical distribution of human and canine ASR was well correlated ($r = 0.664$, $P < 0.05$), with the highest values for human and canine ASR detected in the same urban municipalities of the Greater Porto: Porto, Matosinhos and Maia. These findings suggest the existence of exposure similarities, supporting the relevance of cancer surveillance in pet animals as efficient tools to predict health hazards for humans.

Keyword: Dog; Cancer epidemiology; Comparative oncology; Geographic distribution; Non-Hodgkin's lymphoma

57. Genetics of male reproductive performance in White Leghorns/ Wolc, Anna; Arango, Jesus; Settar, Petek; Fulton, Janet E.; O'Sullivan, Neil P.; Dekkers, Jack C.M.. Poultry Science. ISSN:0032-5791 7(2019) v.98 p.2729-2733Poultry Science

DOI: 10.3382/ps/pez077

Link: <http://www.sciencedirect.com/science/article/pii/S0032579119302019>

Abstract: ABSTRACT The ability to produce viable progeny is a complex trait, involving both male and female components. In poultry, mating ratios are usually 1 male to 6 to 12 females. Consequently, the impact of male reproductive failure is much greater than that for a female. In this study, the genetic determination of male reproductive performance, by natural mating and artificial insemination (AI), was evaluated. Semen quality was studied in 1,575 pre-selected (using a selection index of multiple egg production and quality traits) White Leghorn males of a single pure line from multiple generations. A subset of individuals with satisfactory semen quality (based on sperm count and motility) were further tested for subsequent fertility and hatchability. Genetic parameters for fertility (FER), hatch of fertile (HOF), hatch of set (HOS), sperm motility (SM), sperm count (SC), and fertility using AI (FER-AI) were estimated using single- and multi-trait animal models, with generation as fixed effect. Selected birds were genotyped using the 600K Affymetrix SNP chip. Genomic data were analyzed with the BayesB method. FER, HOS, and HOF were highly correlated, both genetically (0.82 to 0.99) and phenotypically (0.28 to 0.99), but genetic correlations with semen quality traits were not strong (0.05 to 0.43) and phenotypic correlations varied between generations (−0.13 to 0.14). Birds used for fertility and hatchability tests were pre-selected based on SM and SC, which could contribute to the lack of strong correlations between these traits (due to truncation of the distribution). Based on pedigree information, low to moderate heritabilities were estimated for reproductive traits (0.08 to 0.21). Markers explained a low proportion of phenotypic variance (0.04 to 0.15), probably due to stringent selection of genotyped individuals and the limited training set size. No genes with large effects were identified. Genomic estimated breeding values were more accurate than pedigree-based estimates but only for HOF and FERT-AI. Despite low estimates of accuracy in validation, genetic trends were positive for all analyzed traits. In conclusion, continued long-term selection can result in genetic improvement of reproductive performance of roosters.

Keyword: semen quality; fertility; genetics; hatchability; Leghorn male

58. Establishment of 3-dimensional scaffolds from hemochorial placentas/ Favaron, Phelipe O.; Borghesi, Jéssica; Mess, Andrea Maria; Castelucci, Patricia; Schiavo Matias, Gustavo de Sá; Barreto, Rodrigo da Silva Nunes; Miglino, Maria Angelica. Placenta. ISSN:0143-4004 (2019) v.81 p.32-41Placenta

DOI: 10.1016/j.placenta.2019.04.002

Link: <http://www.sciencedirect.com/science/article/pii/S0143400418306994>

Abstract: Introduction The extracellular matrix (ECM) is a complex, tissue-specific 3-dimensional network that controls cell processes. ECMs derived from various organs are used to produce biological scaffolds comparable to the native microenvironment. Although placentas are often overlooked, they offer a rich ECM for tissue engineering, especially the hemochorial placentas from rodents and lagomorphs that resemble the ones from humans. Methods Here we established a protocol for decellularization and investigated the ECM in native and decellularized placentas of guinea pigs, rats and rabbits by means of histology, immunohistochemistry, immunofluorescence and scanning

electron microscopy. Results Effective decellularization were achieved by immersion in 0.25% Sodium Dodecyl Sulfate for 3 days, resulting in an intact ECM, while cells or nuclei were absent. All species had a high diversity of ECM components that varied between areas. Discussion Dense fibrous networks in the junctional zone were strongly positive to collagen I, III and IV, fibronectin, and laminin ECM markers. Noticeable response were also found for the decidua, especially along the maternal vessels. The labyrinth had thin fibers strongly positive for fibronectin and laminin, but not much for collagens. In conclusion, we established an effective protocol to obtain biological scaffolds from animal models with hemochorial placentas that possessed promising values for future purposes in Regenerative Medicine.

Keyword: Extracellular matrix; Tissue engineering; Matrix biology; Placenta

59. Comparison of micro-computed tomography and histomorphometry in the measurement of bone–implant contact ratios/ **Choi, Jung-Yoo; Park, Jae-II; Chae, Ji Soo; Yeo, In-Sung Luke.** Oral Surgery, Oral Medicine, Oral Pathology and Oral Radiology. ISSN:2212-4403 1(2019) v.128 p.87-95 Oral Surgery, Oral Medicine, Oral Pathology and Oral Radiology

DOI: 10.1016/j.oooo.2018.12.023

Link: <http://www.sciencedirect.com/science/article/pii/S221244031930001X>

Abstract: Objective The purpose of this study was to measure the 3-dimensional (3D) bone-to-implant contact (BIC) ratios calculated with an associated software algorithm on 3D micro–computed tomography (μ CT) scans and compare them with measurements made with 2-dimensional histomorphometry. Study Design For uncomplicated calculation of the 3D BIC ratios, 16 implants (8 grade 2 titanium and 8 grade 4 titanium) with simple cylindrical geometry were inserted into 8 rabbit tibiae; 2 implants were inserted into each tibia. The experimental animals were sacrificed at 2 weeks after surgery. The implants were surgically removed en bloc with surrounding bone. 3D μ CT images were acquired and reconstructed, and histomorphometric procedures were performed. The calculated 3D BIC ratios were compared with the histomorphometrically measured BIC ratios. Results When the 3D BIC ratios calculated in this study were compared with the BIC ratios measured conventionally by using histologic slides for light microscopy, no significant statistical correlation was found between the 2 ratios ($P \geq .35$). Conclusions This study indicated that 3D μ CT should be used for more accurate BIC assessment to produce an overall 3D picture for the bone–implant interface.

Keyword:

60. Acute phase proteins, proinflammatory cytokines and oxidative stress biomarkers in sheep, goats and she-camels with *Coxiella burnetii* infection-induced abortion/ **El-Deeb, Wael; Ghoneim, Ibrahim; Fayez, Mahmoud; Elsohaby, Ibrahim; Alhaider, Abdulrahman; ElGiouhy, Magdy.** Comparative Immunology, Microbiology and Infectious Diseases. ISSN:0147-9571 (2019) v.67 p.101352 Comparative Immunology, Microbiology and Infectious Diseases

DOI: 10.1016/j.cimid.2019.101352

Link: <http://www.sciencedirect.com/science/article/pii/S0147957119301493>

Abstract: Acute phase proteins (APPs) and oxidative stress are helpful markers in diagnosis of several infectious diseases. APPs, proinflammatory cytokines and oxidative stress markers were evaluated for their role in the diagnosis

of naturally acquired *Coxiella burnetii* (Q fever) associated with abortion in sheep, goats and she-camels. Blood, aborted materials and vaginal swabs were collected from mixed herds in the Eastern Province of Saudi Arabia. Antioxidant biomarkers showed significant decline in cases of abortion compared to control animals at delivery time. The correlation between disease status and all parameters ranged from moderate to high. The APPs, cytokines and the oxidative stress marker malondialdehyde (MDA) displayed a high degree of distinction between aborted sheep and goat and normal delivered animals (AUC > 0.90). However, only MDA showed a high degree of differentiation (AUC > 0.90) between aborted she-camels and normal delivered controls. In conclusion, results from our study allow us to recommend using APPs, cytokines and oxidative stress markers as an additional tool for diagnosis of naturally occurring *C. burnetii* infection in sheep, goats and she-camels. However, it does not replace standard procedures for detection of *C. burnetii*.

Keyword: Malondialdehyde; Cytokines; Abortion; Q fever; Serum amyloid A; Haptoglobin

61. Concomitant exercise training attenuates the cardioprotective effects of pharmacological therapy in a murine model of acute infectious myocarditis/ **Mendonça, Andréa A.S.; Gonçalves, Reggiani V.; Souza-Silva, Thaiany G.; Maldonado, Izabel R.S.C.; Talvani, André; Natali, Antônio J.; Novaes, Rômulo D.** Life Sciences. ISSN:0024-3205 (2019) v.230 p.141-149Life Sciences

DOI: 10.1016/j.lfs.2019.05.059

Link: <http://www.sciencedirect.com/science/article/pii/S0024320519304151>

Abstract: When administered alone, preinfection exercise training and benznidazole-based chemotherapy induce cardioprotection in Chagas disease. However, the effect of concomitant exercise and benznidazole treatment is unknown. We investigated whether exercise and specific chemotherapy could interact to modulate parasitemia, inflammation, redox status and heart damage in a murine model of *T. cruzi* infection. Wistar rats were randomized into an uninfected control group (CNT) and four groups infected with *T. cruzi*: sedentary untreated (SUN) and treated (STR), and trained untreated (TUN) and treated (TTR). Running training was administered 5 days/week for 4 weeks. Treated animals concomitantly received 100 mg/kg/day benznidazole. Heart inflammation and reactive damage were not detected in CNT animals. Compared to SUN, TUN animals presented increased levels of parasitemia, myocarditis, nitric oxide, hydrogen peroxide, protein carbonyl, malondialdehyde, cytokines (IFN- γ , TNF- α , IL-4, IL-6, IL-10 and IL-17), catalase, superoxide dismutase and glutathione reductase activity, as well as reduced heart non-protein antioxidant levels ($P < 0.05$). TTR animals exhibited higher levels of parasitemia, myocarditis, hydrogen peroxide, malondialdehyde, IFN- γ , TNF- α and IL-6 than STR animals ($P < 0.05$), which showed the lowest levels of all analyzed parameters compared to the other groups ($P < 0.05$). Our findings indicate that exercise aggravates acute infection. When concomitantly administered with benznidazole, exercise training impaired parasitic control and chemotherapy-induced cardioprotection in *T. cruzi*-infected rats. Considering that exercise training and *T. cruzi* infection constitute independent metabolic challenges, the negative effects of concomitant treatment are potentially related to the overlapping oxidative and immunoinflammatory demands of exercise and the infection itself.

Keyword: Oxidative stress; Chagas cardiomyopathy; Exercise training; Experimental pathology

62. Immunotherapy of Endothelin-1 Receptor Type A for Pulmonary Arterial Hypertension/ **Dai, Yong; Chen, Xiao; Song, Xiaoxiao; Chen, Xijun; Ma, Wenrui; Lin, Jibin; Wu, Hailang; Hu, Xiajun; Zhou, Yanzhao; Zhang, Hongrong; Liao,**

Yuhua; Qiu, Zhihua; Zhou, Zihua. Journal of the American College of Cardiology. ISSN:0735-1097 20(2019) v.73 p.2567-2580Journal of the American College of Cardiology

DOI: 10.1016/j.jacc.2019.02.067

Link: <http://www.sciencedirect.com/science/article/pii/S0735109719345747>

Abstract: Background Pulmonary arterial hypertension (PAH) is a chronic fatal disease. The treatment of PAH is less than ideal and the control is far from satisfactory worldwide. Vaccination provides a promising approach for treatment of PAH. Objectives This study sought to find a vaccine against endothelin-1 (ET-1) receptor type A (ETAR) for treating PAH. Methods The ETRQ β -002 vaccine was screened and the specific antibodies against epitope ETR-002 belonging to the second extracellular loop of ETAR (including the polyclonal and monoclonal antibody) were produced. The effect of the antibodies on Ca²⁺-dependent signal transduction events was investigated. In vivo, ETRQ β -002 vaccine was used to vaccinate monocrotaline (MCT)- and Sugen/hypoxia-induced pulmonary hypertension animals. The monoclonal antibody (mAb) against ETR-002 was also injected into the PAH animals. The effect of ETRQ β -002 vaccine on pulmonary hypertension and remodeling of pulmonary arterioles and right ventricle (RV) was carefully evaluated. Further, the possible immune-mediated damage was detected in normal vaccinated animals. Results ETR-002 peptide has perfect immunogenicity and ETRQ β -002 vaccine could induce strong antibody production. In vitro, the anti-ETR-002 antibody bound to ETAR and inhibited Ca²⁺-dependent signal transduction events, including extracellular signal-regulated kinase phosphorylation and elevation of intracellular Ca²⁺ concentration induced by ET-1. In vivo, both ETRQ β -002 vaccine and the mAb significantly decreased the RV systolic pressure up to 20 mm Hg and 10 mm Hg in MCT-exposed rats and Sugen/hypoxia-exposed mice, respectively. Also, ETRQ β -002 vaccine/mAb obviously ameliorated pathological remodeling of pulmonary arterioles and hypertrophy of the RV in PAH animals. Additionally, no significant immune-mediated damage was detected in vaccinated animals. Conclusions ETRQ β -002 vaccine/mAb attenuated remodeling of pulmonary arterioles and RV in MCT- and Sugen/hypoxia-induced PAH animals and decreased RV systolic pressure effectively through diminishing the pressure response and inhibiting signal transduction initiated by ET-1. ETRQ β -002 vaccine/mAb may provide a novel and promising method for PAH treatment.

Keyword: vaccine; immunotherapy; endothelin-1; endothelin-1 receptor type A; ET-1; ETAR; pulmonary arterial hypertension

63. Dietary fat, cholesterol, and cholic acid affect the histopathologic severity of nonalcoholic steatohepatitis in Sprague-Dawley rats/ **Fukuda, Ayumi; Sasao, Marin; Asakawa, Eri; Narita, Sumire; Hisano, Mei; Suruga, Kazuhito; Ichimura, Mayuko; Tsuneyama, Koichi; Tanaka, Kazunari; Omagari, Katsuhisa.** Pathology - Research and Practice. ISSN:0344-0338 11(2019) v.215 p.152599Pathology - Research and Practice

DOI: 10.1016/j.prp.2019.152599

Link: <http://www.sciencedirect.com/science/article/pii/S0344033819311185>

Abstract: Understanding of the pathogenesis of nonalcoholic steatohepatitis (NASH)-associated fibrosis has been hampered by the lack of a comprehensive and physiological small animal model of NASH with fibrosis. Feeding a high-fat and high-cholesterol (HFC) diet supplemented with cholic acid to rats is known to replicate human NASH pathology, and it induces fibrosis earlier than with an HFC diet alone. In the present study, physiological and histopathological observations from 65 Sprague-Dawley (SD) rats fed an HFC diet with or without cholic acid for 9 or 18 weeks in our laboratory between January 2013 and February 2018 were retrospectively reviewed. The liver weight/body weight ratio at the end of the rearing period was higher in rats fed an HFC diet than in rats fed a normal

diet in a cholesterol dose-, cholic acid dose-, or rearing period dependent manner. Dietary fat, cholesterol and/or cholic acid and rearing period affected the histopathologic severity of NASH. Overall, 56 (86.2%) of 65 SD rats fed an HFC diet for 9 or 18 weeks developed histopathologically proven NASH. It is noted that the SD rats fed an HFC diet supplemented with 2% (w/w) cholic acid for 18 weeks frequently developed advanced fibrosis, including cirrhosis. Thus, this diet-induced NASH rat model is likely to be a highly reproducible.

Keyword: Animal model; Cholic acid; Hepatic fibrosis; High-fat high-cholesterol diet; Nonalcoholic steatohepatitis

64. Fatty acid, volatile and sensory profiles of milk and cheese from goats raised on native semiarid pasture or in confinement/ **Sant'Ana, Amanda M.S.; Bessa, Rui J.B.; Alves, Susana P.; Medeiros, Ariosvaldo N.; Costa, Roberto G.; de Sousa, Yasmim R.F.; Bezerril, Fabrícia F.; Malveira Batista, Ana S.; Madruga, Marta Suely; Queiroga, Rita C.R.E.**. International Dairy Journal. ISSN:0958-6946 (2019) v.91 p.147-154International Dairy Journal

DOI: 10.1016/j.idairyj.2018.09.008

Link: <http://www.sciencedirect.com/science/article/pii/S0958694618302322>

Abstract: The fatty acid (FA), volatile and sensory profiles of cheese and milk, obtained from goats grazing native pastures (PS) of semiarid region of Brazil or kept under confinement (CS), were evaluated. Milk and cheese from native pasture-fed animals contained higher amounts of oleic acid, stearic acid, total polyunsaturated, cis-monounsaturated and trans FA, and lower amounts of medium chain FA, total saturated FA and rumenic acid compared with milk and cheese from confined goats. Two terpenes (α -terpineol and β -caryophyllene) were exclusively detected in PS milk and cheese. Milk from the PS group presented higher intensity for herbaceous flavour and lower butter aroma, butter flavour and residual persistence compared with CS milk. Both PS cheese and milk presented higher overall acceptability compared with CS counterparts.

Keyword:

65. A Standardized Anxiety Quotient in Elevated Open Platform Task Quantifies Rodent Anxiogenic Tendency with Improved Reliability and Sensitivity/ **Suo, William Z.; Peng, David W.; Singh, Prabhakar; Ding, Xue-Feng.** Neuroscience. ISSN:0306-4522 (2019) v.423 p.12-17Neuroscience

DOI: 10.1016/j.neuroscience.2019.10.030

Link: <http://www.sciencedirect.com/science/article/pii/S0306452219307225>

Abstract: Sensitivity and reliability of animal behavioral assessment methods are critical for successful translation of in vitro findings to in vivo. Here we report a data transformation process in the elevated open platform task that generates a novel parameter, namely peak tolerance of fear (PTF) or its inversely correlated equivalent of anxiety quotient (AQ), to measure anxiogenic tendency in rodent. As compared to traditional parameters such as travel distance, time, or entries, PTF or AQ displays largely reduced data dispersion not only ingroup but also cross-study and cross-cohort, therefore representing a significant improvement of the methodology for rodent anxiety assessment.

Keyword: reliability; anxiety; behavioral test; binary; elevated open platform; elevated plus maze; rodent; sensitivity

66. Relation between periodontal disease and systemic diseases in dogs/ **Pereira dos Santos, José Diogo; Cunha, Eva; Nunes, Telmo; Tavares, Luís; Oliveira, Manuela.** Research in Veterinary Science. ISSN:0034-5288 (2019) v.125 p.136-140Research in Veterinary Science

DOI: 10.1016/j.rvsc.2019.06.007

Link: <http://www.sciencedirect.com/science/article/pii/S003452881930219X>

Abstract: Periodontal disease (PD) is one of the most frequent and widespread inflammatory diseases in dogs. The onset of PD pathogenesis is prompted by the dental microbial biofilm combined with the animal immune-inflammatory response. Along with local effects, systemic consequences can occur secondary to dental plaque-associated bacteraemia, affecting distant tissues and organs. The main goal of this retrospective study was to access and evaluate the association between PD and systemic consequences (renal, hepatic and cardiac) in a group of 136 dogs. Clinical records of all animals were assessed for general and systemic information, further analysed by general linear model and Odds-Ratio. Animals were organized in two groups, PD group and control group, formed by animals without PD. In this population, increasing age was proven to be a risk factor (OR = 1.04, $p < .01$) for PD establishment. Small breeds (<10 Kg) were the most prevalent in the PD group, being more susceptible to this disease. On the other hand, no influence of gender or reproductive status in PD progression was observed. Regarding systemic diseases, a statistically significant association ($p = .026$) was obtained between PD and cardiac disease. Results show that PD can have a significant adverse impact on animals' health, being related with systemic consequences, which may increase morbidity and mortality rates of these animals. PD prevention, with focus on owner's information about this disease and its management, are essential points for an active PD control program.

Keyword: Dogs; Periodontal disease; Systemic consequences

67. Exposure to early life adversity alters the future behavioral response to a stressful challenge in BALB/C mice/ **Nisar, Safia; Farooq, Rai Khalid; Nazir, Sadia; Alamoudi, Widyan; Alhibshi, Amani.** Physiology & Behavior. ISSN:0031-9384 (2019) v.210 p.112622Physiology & Behavior

DOI: 10.1016/j.physbeh.2019.112622

Link: <http://www.sciencedirect.com/science/article/pii/S003193841930527X>

Abstract: Depression is considered as a maladaptive response to stress in adult life. Exposure to stress in early childhood is recognized as a risk factor for being unable to adapt to environmental changes in adult life. Early life stress (ELS) has been modelled in animals to help understand the behavioral outcome of the adversity. Periodic maternal separation (MS) in rodents for the first two weeks of life is one such model. We used MS as a form of ELS in Balb/c mice to study its effect on a stressful challenge encountered in adult life. According to our results, exposure to MS predisposed mice to an altered behavioral response. However, this response was not worsened by exposure to restraint stress (RS) experienced in early adult life. This controversy may be attributed to methodological and biological variations among animals as well as humans.

Keyword:

68. Antihyperlipidemic effect of iridoid glycoside deacetylasperulosidic acid isolated from the seeds of *Spermacoce hispida* L. - A traditional antiobesity herb/ **Esakkimuthu, S.; Nagulkumar, S.; Darvin, S.Sylvester; Buvanesvaragurunathan, K.; Sathya, T.N.; Navaneethakrishnan, K.R.; Kumaravel, T.S.; Murugan, S.S.; Shiota, Osamu; Balakrishna, K.; Pandikumar, P.; Ignacimuthu, S.** Journal of Ethnopharmacology. ISSN:0378-8741 (2019) v.245 p.112170 Journal of Ethnopharmacology

DOI: 10.1016/j.jep.2019.112170

Link: <http://www.sciencedirect.com/science/article/pii/S037887411931150X>

Abstract: Ethnobotanical relevance The interest on herbal health supplements for obesity is increasing globally. Our previous ethnobotanical survey in Tiruvallur district, Tamil Nadu, India indicated the use of *Spermacoce hispida* L. seeds for the treatment of obesity. Aim of the study This study was aimed to validate the traditional claim and to identify the antihyperlipidemic principle in the seeds of *Spermacoce hispida* using bioassay guided fractionation method. Methods Bioassay monitored fractionation of the aqueous extract from *Spermacoce hispida* seeds was carried out using triton WR 1339 induced hyperlipidemic animals. It yielded deacetylasperulosidic acid (DAA) as the active ingredient. Pharmacokinetic properties of DAA were predicted using DataWarrior and SwissADME tools. In vitro antiobesity and antihyperlipidemic effects of DAA were evaluated in 3T3L1 preadipocytes and HepG2 cells, respectively. The chronic antihyperlipidemic efficacy of DAA was evaluated in high fat diet fed rats. Results DAA did not show any mutagenic and tumorigenic properties. It bound with PPAR α with comparable ligand efficiency as fenofibrate. The treatment with DAA significantly lowered the proliferation of matured adipocytes, but not preadipocytes. The treatment of steatotic HepG2 cells with DAA significantly decreased the LDH leakage by 43.03% ($P < 0.05$) at 50 μ M concentration. In triton WR 1339 induced hyperlipidemic animals, the treatment with 50 mg/kg dose significantly lowered the TC, TG and LDL-c levels by 40.27, 46.00 and 63.65% respectively. In HFD fed animals, the treatment at 10 mg/kg decreased BMI and AC/TC ratio without altering SRBG. It also improved serum lipid, transaminases and phosphatases levels of HFD fed animals. The treatment lowered adipocyte hypertrophy and steatosis of hepatocytes. Conclusion This preliminary report supported the traditional use of *Spermacoce hispida* for the treatment of obesity. Further detailed investigations on the long term safety, efficacy and molecular mode of action of *Spermacoce hispida* and DAA will throw more light on their usefulness for the management of obesity.

Keyword: Obesity; Bioassay guided fractionation; Healthcare supplements; Siddha

69. Social-housing and use of double-decker cages in rat telemetry studies/ **Skinner, Matt; Ceuppens, Peter; White, Peter; Prior, Helen.** Journal of Pharmacological and Toxicological Methods. ISSN:1056-8719 (2019) v.96 p.87-94 Journal of Pharmacological and Toxicological Methods

DOI: 10.1016/j.vascn.2019.02.005

Link: <http://www.sciencedirect.com/science/article/pii/S1056871918307834>

Abstract: Rat telemetry is widely used for biomedical research purposes and is used routinely in early pre-clinical drug development to screen for the potential cardiovascular risk of candidate drugs. Historically, these studies have been conducted in individually housed conditions which can impact significantly on an animal's welfare. Here we present data from a survey of pharmaceutical companies and contract research organisations to define current industry practices relating to the housing of rats during telemetry studies and to expand and complement a similar project in non-rodents. Results of the survey showed that 75% of respondents socially house rats on non-recording days of telemetry studies, whereas on recording days only 46% of respondents socially house the animals. When

social housing is used on rat telemetry studies, rats are usually housed with an unrecorded companion animal. We also present and compare data from a telemetry study in standard individually ventilated cages (IVCs) with a study using new double-decker IVCs, both conducted using a companion animal approach. Telemetry signals were successfully collected from the double-decker IVCs without a loss of signal quality whilst offering a more spacious environment that allowed the animals to exhibit natural behaviours including full upright posture. Cardiovascular responses following pharmacological intervention with verapamil were similar when assessed in the standard and double-decker cages. Power analysis was conducted on pooled data from the studies in socially housed animals with preliminary results showing the power of detection of drug-induced effects is equivalent to previously published data in individually housed rats. This illustrates that telemetry recordings can be made from rats in socially housed conditions within standard or larger double-decker cages for the collection of cardiovascular telemetry data.

Keyword: Rat; Methods; Cardiovascular; Double-decker; Individual housing; IVC; Refinement; Social housing; Telemetry; Verapamil

70. Development of a motor and somatosensory evoked potentials-guided spinal cord Injury model in non-human primates/ **Baklaushev, V.P.; Durov, O.V.; Kim, S.V.; Gulaev, E.V.; Gubskiy, I.L.; Konoplyannikov, M.A.; Zabozaev, F.G.; Zhang, C.; Agrba, V.Z.; Orlov, S.V.; Lapin, B.A.; Troitskiy, A.V.; Averyanov, A.V.; Ahlfors, J-E.** Journal of Neuroscience Methods. ISSN:0165-0270 (2019) v.311 p.200-214Journal of Neuroscience Methods

DOI: 10.1016/j.jneumeth.2018.10.030

Link: <http://www.sciencedirect.com/science/article/pii/S0165027018303443>

Abstract: Background Nonhuman primates (NHP) may provide the most adequate (in terms of neuroanatomy and neurophysiology) model of spinal cord injury (SCI) for testing regenerative therapies, but bioethical considerations exclude their use in severe SCI. New Method A reproducible model of SCI at the lower thoracic level has been developed in Rhesus macaques. The model comprises surgical resection of 25% of the spinal cord in the projection of the dorsal funiculus and dorsolateral corticospinal pathways, controlled via registration of intraoperative evoked potentials (EPs). The animals were evaluated using the modified Hindlimb score, MRI, SSEP, and MEP over a time period of 8–12 weeks post-SCI, followed by histological examination. Results Complete disappearance of intraoperative EPs from distal hindlimb muscles without restoration within two weeks post-SCI was an indicator for irreversible disruption of the abovementioned pathways. As a result, controlled damage to the spinal cord was achieved in three NHPs, clinically manifested as irreversible lower monoplegia. No significant functional restoration was observed in these NHPs up to 12 weeks post-SCI. Demyelination of the damaged ascending tracts was detected. Disturbances in pelvic organ function were not observed in all animals. Comparison with existing methods The new method of EPs-guided SCI allows a more controlled and irreversible damage to the spinal cord compared with contusion and other transection approaches. Conclusions This method to induce complete SCI in NHP is well tolerated, reproducible and ethically acceptable: these are valuable attributes in a preclinical model that will hopefully help advance testing of new regenerative therapies in SCI.

Keyword: Morphometry; Animal models; Spinal cord injury; Demyelination; MEP; Nonhuman primates; SCI; SSEP

71. Urinary concentrations and distribution profiles of 21 phthalate metabolites in pet cats and dogs/ **Karthikraj, Rajendiran; Lee, Sunmi; Kannan, Kurunthachalam.** Science of The Total Environment. ISSN:0048-9697 (2019) v.690 p.70-75Science of The Total Environment

DOI: 10.1016/j.scitotenv.2019.06.522

Link: <http://www.sciencedirect.com/science/article/pii/S0048969719331092>

Abstract: Phthalates are widely used in several consumer products, including plastics, toys, cosmetics, and medical devices. Little is known about phthalate exposure in pet animals, however, even though they share an indoor environment with humans; this is the first study to measure such exposure. We measured 21 phthalate monoester metabolites (PhMs) in the urine of pet cats (n = 50) and dogs (n = 50) collected from New York State, USA. PhMs were widely detected in all samples, and 12 of 21 PhMs had detection frequencies (Dfs) >80%. The median urinary concentrations of total PhMs in pet cats and dogs were 630 ng/mL and 186 ng/mL, respectively. Monoethyl phthalate (mEP) was the most abundant compound in both cats and dogs. Phthalic acid (PA; a non-specific metabolite of phthalates) was found at very high concentrations in cats (median: 520 ng/mL). The estimated daily intake (EDI) and hazard quotient (HQ) for major phthalates in pets showed that DEHP exposures in cats and dogs were only 2-fold less than the US Environmental Protection Agency suggested reference dose (RfD) for humans.

Keyword: Pet animals; Urine; DEHP; Phthalate exposure; Plasticizers; Sentinel

72. Bovine pregnancy associated glycoproteins can alter selected transcripts in bovine endometrial explants/
Wallace, Rhianna M.; Hart, Mariah L.; Egen, Tina E.; Schmelzle, Amanda; Smith, Michael F.; Pohler, Ky G.; Green, Jonathan A.. Theriogenology. ISSN:0093-691X (2019) v.131 p.123-132Theriogenology

DOI: 10.1016/j.theriogenology.2019.03.026

Link: <http://www.sciencedirect.com/science/article/pii/S0093691X18307878>

Abstract: This study was designed to examine changes in target transcript abundance in endometrial explants exposed to pregnancy-associated glycoproteins (PAGs). Endometrial explants from pregnant and non-pregnant heifers collected on day18 (day 0: day of insemination) were incubated in the absence or presence of PAGs (15 µg/ml). The PAGs represented a mixture comprised of approximately equal amounts of bovine PAGs 4, 6, and 9. Samples were harvested for RNA extraction after 24 h or 96 h of incubation. Transcript abundance for target genes related to prostaglandin synthesis (PTGES), a chemokine (CXCL5) and tissue remodeling (EMMPRIN; MMPs 1, 2, 3, 7, 8, and 9; PLAUG; SPP1; TIMP1 and TIMP2) were analyzed by quantitative PCR. Changes in relative transcript abundance for MMP1, MMP3, MMP7, PLAUG, EMMPRIN and SPP1 were observed after PAG exposure in both non-pregnant and pregnant endometrium (P < 0.05). However, some of the transcripts associated with tissue remodeling were altered only at certain time points (either 24 h or 96 h). The transcript for bovine CXCL5 was increased in non-pregnant endometrium four- and six-fold at 24 h and 96 h of PAG exposure, respectively (P < 0.05); in pregnant endometrium, only the 24 h incubation period exhibited an elevation in CXCL5 (P < 0.05). In non-pregnant endometrium, both PTGES and MMP9 were elevated after exposure to PAGs for 24 h (P < 0.05) but not in the other samples. Some interferon-responsive transcripts (IFI6, ISG15) were found to be more abundant (P < 0.05) in pregnant endometrium after 96 h exposure to PAGs compared to endometrium that had not been exposed to the PAGs. Likewise, ISG15 message was elevated (P = 0.06) in non-pregnant endometrium after 24 h incubation with PAGs. These results indicate that the PAGs used in this experiment were able to induce changes in endometrial transcripts encoding for proteins associated with matrix remodeling as well as chemokine production and prostaglandin release.

Keyword: Prostaglandin; Endometrium; Placenta; Chemokine; Matrix metalloprotease

73. Microbiota determines insulin sensitivity in TLR2-KO mice/ Guadagnini, Dioze; Rocha, Guilherme Zweig; Santos, Andrey; Assalin, Heloisa Balan; Hirabara, Sandro Massao; Curi, Rui; Oliveira, Alexandre Gabarra; Prada, Patricia O.; Saad, Mario J.A.. Life Sciences. ISSN:0024-3205 (2019) v.234 p.116793Life Sciences

DOI: 10.1016/j.lfs.2019.116793

Link: <http://www.sciencedirect.com/science/article/pii/S0024320519307209>

Abstract: Introduction Environmental factors have a key role in the control of gut microbiota and obesity. TLR2 knockout (TLR2^{-/-}) mice in some housing conditions are protected from diet-induced insulin resistance. However, in our housing conditions these animals are not protected from diet-induced insulin-resistance. Aim The aim of the present study was to investigate the influence of our animal housing conditions on the gut microbiota, glucose tolerance and insulin sensitivity in TLR2^{-/-} mice. Material and methods The microbiota was investigated by metagenomics, associated with hyperinsulinemic euglycemic clamp and GTT associated with insulin signaling through immunoblotting. Results The results showed that TLR2^{-/-} mice in our housing conditions presented a phenotype of metabolic syndrome characterized by insulin resistance, glucose intolerance and increase in body weight. This phenotype was associated with differences in microbiota in TLR2^{-/-} mice that showed a decrease in the Proteobacteria and Bacteroidetes phyla and an increase in the Firmicutes phylum, associated with and in increase in the Oscillospira and Ruminococcus genera. Furthermore there is also an increase in circulating LPS and subclinical inflammation in TLR2^{-/-}. The molecular mechanism that account for insulin resistance was an activation of TLR4, associated with ER stress and JNK activation. The phenotype and metabolic behavior was reversed by antibiotic treatment and reproduced in WT mice by microbiota transplantation. Conclusions Our data show, for the first time, that the intestinal microbiota can induce insulin resistance and obesity in an animal model that is genetically protected from these processes.

Keyword: Insulin resistance; Gut microbiota; LPS; Genetic protection; TLR2

74. Consumer evaluation of intra-sustainable trade-offs in pig production – A mixed-method approach to analyze different consumer segments/ Sonntag, Winnie Isabel; Kiehas, Martina Therese; Spiller, Achim; Kaiser, Anna; Ludolph, Lisa-Marie; Grunert, Klaus G.; Meyer-Höfer, Marie von. Livestock Science. ISSN:1871-1413 (2019) v.224 p.102-113Livestock Science

DOI: 10.1016/j.livsci.2019.04.010

Link: <http://www.sciencedirect.com/science/article/pii/S1871141319305189>

Abstract: ABSTRACT In the ongoing public debate about livestock production systems and especially for pig production, natural living conditions, including sufficient space for each individual animal, outdoor access and litter bedding are the most discussed public issues. In contrast, many consumers are very price sensitive and additionally demand products to have high food safety and high quality. Thus, trade-offs arise for farmers, policymakers and all actors in the supply chain. Up to now, it is widely unknown how people react and deal with intra-sustainable trade-offs in conventional pig farming systems. Typical trade-offs occur, for example, when using farrowing crates for sows, or outdoor access for slaughter pigs. Against a background of little knowledge, a mixed-method approach was used. First, ten qualitative in-depth interviews with German citizens were conducted. There followed an online survey with 1,298 German citizens. Realistic pictures and texts (formulated in cooperation with farmer associations and association for the protection of farm animals) were used to provide the participants with information about trade-offs (farrowing crate and outdoor access). Participants were confronted with trade-offs regarding farrowing crate and outdoor access and were asked to evaluate the systems. Using a cluster analysis, four clusters (“Unsure,” “Vague

decision makers”, “Animal welfare supporters,” and “Animal and environmental protectionists”) were identified to characterize consumers’ evaluation of the trade-offs. The findings of this exploratory multi-method approach show that the given information about the farrowing crate did not lead to more acceptance. Furthermore, the presented negative aspects about outdoor access did not change its positive image. This could be useful for policymakers and all actors in the pig supply chain.

Keyword: Animal welfare; Cluster analysis; Pig production; Consumers; Qualitative interviews; Trade-off

75. Visualization of thalamic calcium influx with quantitative susceptibility mapping as a potential imaging biomarker for repeated mild traumatic brain injury/ **Schweser, Ferdinand; Kyyriäinen, Jenni; Preda, Marilena; Pitkänen, Asla; Toffolo, Kathryn; Poulsen, Austin; Donahue, Kaitlynn; Levy, Benett; Poulsen, David.** NeuroImage. ISSN:1053-8119 (2019) v.200 p.250-258NeuroImage

DOI: 10.1016/j.neuroimage.2019.06.024

Link: <http://www.sciencedirect.com/science/article/pii/S1053811919305154>

Abstract: A key event in the pathophysiology of traumatic brain injury (TBI) is the influx of substantial amounts of Ca²⁺ into neurons, particularly in the thalamus. Detection of this calcium influx in vivo would provide a window into the biochemical mechanisms of TBI with potentially significant clinical implications. In the present work, our central hypothesis was that the Ca²⁺ influx could be imaged in vivo with the relatively recent MRI technique of quantitative susceptibility mapping (QSM). Wistar rats were divided into five groups: naive controls, sham-operated experimental controls, single mild TBI, repeated mild TBI, and single severe TBI. We employed the lateral fluid percussion injury (FPI) model, which replicates clinical TBI without skull fracture, performed 9.4 Tesla MRI with a 3D multi-echo gradient-echo sequence at weeks 1 and 4 post-injury, computed susceptibility maps using V-SHARP and the QUASAR-HEIDI technique, and performed histology. Sham, experimental controls animals, and injured animals did not demonstrate calcifications at 1 week after the injury. At week 4, calcifications were found in the ipsilateral thalamus of 25–50% of animals after a single TBI and 83% of animals after repeated mild TBI. The location and appearance of calcifications on stained sections was consistent with the appearance on the in vivo susceptibility maps (correlation of volumes: $r = 0.7$). Our findings suggest that persistent calcium deposits represent a primary pathology of repeated injury and that FPI-QSM has the potential to become a sensitive tool for studying pathophysiology related to mild TBI in vivo.

Keyword: Calcium; Rats; Biomarker; MRI; Fluid percussion injury; QSM; Quantitative susceptibility mapping; Repeated mild traumatic brain injury

76. Antioxidant peptides (<3 kDa) identified on hard cow milk cheese with rennet from different origin/ **Timón, María L.; Andrés, Ana I.; Otte, Jeanette; Petrón, María J.** Food Research International. ISSN:0963-9969 (2019) v.120 p.643-649Food Research International

DOI: 10.1016/j.foodres.2018.11.019

Link: <http://www.sciencedirect.com/science/article/pii/S0963996918309049>

Abstract: The effect of the addition of rennet from different origin (animal, plant and microbial) on the release of potential antioxidant peptides was evaluated in hard cow milk cheese. After cheese making, chemical parameters,

colour, TBARs and riboflavin content were determined in the final product. Antioxidant activity of the water soluble extracts from cheese was evaluated by the DPPH radical scavenging and metal chelating activity assays. Separation of peptide fractions (<3 kDa) was performed by RP-HPLC and fractions with potential antioxidant activity were analyzed by LC-MS/MS for further identification of peptides. Results suggested that colour and riboflavin content were affected by the type of rennet used ($P < .05$). On the other hand, extracts of cheese with microbial rennet showed the highest antioxidant activity ($P < .05$). Only nine fractions isolated from the extracts showed either DPPH radical scavenging or metal chelating activities. Peptides EIVPN and DKIHPP, previously reported in other studies by showing ACE-inhibitory activity, were identified in these fractions and revealed high metal chelating activity. Moreover, a new peptide, with also high metal chelating activity, has been identified (VAPFPQ). In conclusion, it would be worthwhile to synthesis these peptides and confirm their antioxidant and metal chelating activities.

Keyword: Animal rennet; Antioxidant peptide; Aqueous extract; Cheese; Microbial rennet; Plant rennet

77. Connecting children's scientific funds of knowledge shared on social media to science concepts/ **Mills, Kelly; Bonsignore, Elizabeth; Clegg, Tamara; Ahn, June; Yip, Jason; Pauw, Daniel; Cabrera, Lautaro; Hernly, Kenna; Pitt, Caroline.** International Journal of Child-Computer Interaction. ISSN:2212-8689 (2019) v.21 p.54-64International Journal of Child-Computer Interaction

DOI: 10.1016/j.ijcci.2019.04.003

Link: <http://www.sciencedirect.com/science/article/pii/S2212868918300953>

Abstract: The ubiquitous use of social media by children offers a unique opportunity to view diverse funds of knowledge that may otherwise be overlooked. We have iteratively designed a social media app to be integrated into our science learning program which engages families in science in their community. This case study highlights how three focal learners (ages 9–14) revealed scientific funds of knowledge through social media sharing. Their teachers noticed occasional funds of knowledge in the children's posts that they could connect to formal science concepts. However, other scientific funds of knowledge were not obvious by observing the posts alone. Rather, these latent funds of knowledge emerged through our triangulation of posts, interviews and observations of their learning experiences in our life-relevant science education program. Our findings suggest implications for the design of technology and learning environments to facilitate the connection of children's implicit and more unconventional scientific funds of knowledge to formal science concepts.

Keyword: Social media; Children; Science learning; Scientific funds of knowledge

78. Measuring the knowledge translation and convergence in pharmaceutical innovation by funding-science-technology-innovation linkages analysis/ **Du, Jian; Li, Peixin; Guo, Qianying; Tang, Xiaoli.** Journal of Informetrics. ISSN:1751-1577 1(2019) v.13 p.132-148Journal of Informetrics

DOI: 10.1016/j.joi.2018.12.004

Link: <http://www.sciencedirect.com/science/article/pii/S1751157718301779>

Abstract: We propose a backward tracking model for measuring knowledge transfer in the whole translational research spectrum. Using the drugs-patents-papers-grants backward linkages, we try to figure out the funding-science-technology-innovation translational pattern and ponder some policy implications on e.g., which priority

areas and knowledge convergence level are more likely to generate new drugs. The drug-patent linkage data was accessed through the USFDA Orange Book, covering a drug's active ingredient, formulation, or methods of use for approved indications. It will take about 10 years from the application of earliest patent to the approval of the new drug. Also such high-value patents in FDA Orange Book tend to cite scientific knowledge published on average 10–15 years ago. The technology linkage of new drugs was relatively stable while the science linkage of technology inventions increased rapidly. Among the scientific papers cited by drug patents, private-institution originated papers are only a quarter of the public. By linking these scientific papers with funding sources, we found a large majority (90%) are public-funded and only a very small part are private-funded or public-private joint-funded. Our study also indicates the importance of research on such fields as pharmacology, chemistry (including medicinal chemistry, biochemistry, and organic chemistry), molecular biology, neurosciences, and immunology on new drugs innovation. There is no obvious relationship between “basicness” and linkages to the resulting patents’ impact and to drugs innovation. A balanced basic research and applied research maybe essential for fostering drug innovation because it is a complete chain translating from basic discovery to clinical evidence then to clinical practice. In order to achieve successful pharmaceutical innovation, rather than focusing on only technology, convergence with science at moderate levels (maybe 1/3) is suggested.

Keyword: Translational research; FDA Orange book; Non-patent literature; Science policy; Scientometric analysis

79. Detection of neural connections with ex vivo MRI using a ferritin-encoding trans-synaptic virus/ **Zheng, Ning; Su, Peng; Liu, Yue; Wang, Huadong; Nie, Binbin; Fang, Xiaohui; Xu, Yue; Lin, Kunzhang; Lv, Pei; He, Xiaobin; Guo, Yi; Shan, Baoci; Manyande, Anne; Wang, Jie; Xu, Fuqiang.** *NeuroImage*. ISSN:1053-8119 (2019) v.197 p.133-142 *NeuroImage*

DOI: 10.1016/j.neuroimage.2019.04.039

Link: <http://www.sciencedirect.com/science/article/pii/S1053811919303258>

Abstract: The elucidation of neural networks is essential to understanding the mechanisms of brain functions and brain disorders. Neurotropic virus-based trans-synaptic tracing tools have become an effective method for dissecting the structure and analyzing the function of neural-circuitry. However, these tracing systems rely on fluorescent signals, making it hard to visualize the panorama of the labeled networks in mammalian brain in vivo. One MRI method, Diffusion Tensor Imaging (DTI), is capable of imaging the networks of the whole brain in live animals but without information of anatomical connections through synapses. In this report, a chimeric gene coding for ferritin and enhanced green fluorescent protein (EGFP) was integrated into Vesicular stomatitis virus (VSV), a neurotropic virus that is able to spread anterogradely in synaptically connected networks. After the animal was injected with the recombinant VSV (rVSV), rVSV-Ferritin-EGFP, into the somatosensory cortex (SC) for four days, the labeled neural-network was visualized in the postmortem whole brain with a T2-weighted MRI sequence. The modified virus transmitted from SC to synaptically connected downstream regions. The results demonstrate that rVSV-Ferritin-EGFP could be used as a bimodal imaging vector for detecting synaptically connected neural-network with both ex vivo MRI and fluorescent imaging. The strategy in the current study has the potential to longitudinally monitor the global structure of a given neural-network in living animals.

Keyword: MRI; Ferritin; Fluorescent imaging; Synaptically connected neural networks; VSV

80. Galectin-1 induces immune response and antiviral ability in Cherry Valley ducks after duck plague virus infection/ **Han, Shaojie; Li, Rong; Lin, Jing; Hou, Xiaolan; Weng, Hongyu; Zhang, Huihui; Wang, Yanhua; Li, Ning; Chai, Tongjie; Wei, Liangmeng.** Developmental & Comparative Immunology. ISSN:0145-305X (2019) v.98 p.205-213Developmental & Comparative Immunology

DOI: 10.1016/j.dci.2019.04.005

Link: <http://www.sciencedirect.com/science/article/pii/S0145305X18305639>

Abstract: Galectin-1, as a typical animal galactose-binding protein, it is found on the cell surface and in the extracellular matrix. Cloning the full-length coding sequence of galectin-1 from the spleens of Cherry Valley ducks revealed that the coding sequence of duck galectin-1 (duGal-1) comprises 405 bp, encoding 134 amino acids. Homologic analysis revealed its amino acid sequence is most identical to that of *Anas platyrhynchos* (98.8%) followed by *Gallus gallus*. Quantitative real-time PCR analysis indicated that duGal-1 mRNA is broadly expressed in healthy Cherry Valley duck tissues, primarily in the heart and trachea but minimally in the lung and skin. Meanwhile, the duGal-1 expression is slightly upregulated in the infected liver and spleen. Furthermore, the expression levels of ISGs (Mx, PKR, OAS) and some cytokines such as IFN- α , IL-1 β , IL-2, are up-regulated to varying degrees after overexpression the duGal-1. In contrast, Knockdown of duGal-1 found that the expression levels of ISGs and some inflammatory cytokines were down-regulated. Antiviral assay showed that duGal-1 could inhibit viral replications early during infection. This is the first study of the cloning, tissue distribution, and antiviral immune responses of duGal-1, and findings imply it is involved in the early stages of antiviral innate immune responses to duck plague virus infections in ducks.

Keyword: Cytokines; Immune response; Antiviral; Biological function; Galectin-1

81. Low-Cost Livestock Global Positioning System Collar from Commercial Off-the-Shelf Parts/ **Karl, Jason W.; Sprinkle, James E.** Rangeland Ecology & Management. ISSN:1550-7424 6(2019) v.72 p.954-958Rangeland Ecology & Management

DOI: 10.1016/j.rama.2019.08.003

Link: <http://www.sciencedirect.com/science/article/pii/S1550742419300582>

Abstract: Global Positioning System (GPS) tracking devices are a fundamental technology for quantifying the distribution and movement of livestock across landscapes. Although costs of GPS devices have decreased, it is still cost prohibitive to implement a large number of collars per study. Our objective was to develop and test a low-cost GPS collar using commercial off-the-shelf (COTS) electronic components to study livestock distribution and movement. Our COTS GPS tracker was built using the popular Arduino open-source microcontroller and a low-power timer board to cycle a GPS at defined intervals. Location data were saved to a data card in an open format for easy analysis. Total cost per COTS GPS device (including housing and collar) was \$54.78. Average displacement from a known location and 95% circular error probability was 4.58 m, commensurate with other GPS collars. We tested durability and field performance of 25 COTS GPS collars against 24 existing GPS collars recording data at 5-min intervals in a southwest Idaho, United States study area. Our COTS GPS design and test showed that it is possible to manufacture low-cost location tracking devices, but the limitations of such devices must be considered relative to study objectives and duration. Low-cost location trackers will encourage collection of a higher density of location information to better understand patterns of livestock use in rangeland landscapes.

Keyword: animal tracking; Arduino; Global Positioning System; GPS location; livestock distribution

82. Innovative approaches in cognitive aging/ Austad, Steven N.; Wood, Marcelo A.; Villeda, Saul A.; Voss, Joel L.; Sahay, Amar; Albert, Marilyn. *Neurobiology of Aging*. ISSN:0197-4580 (2019) v.83 p.150-154 *Neurobiology of Aging*

DOI: 10.1016/j.neurobiolaging.2019.04.013

Link: <http://www.sciencedirect.com/science/article/pii/S0197458019301277>

Abstract: Novel approaches to address cognitive aging and to delay or prevent cognitive decline in older individuals will require a better understanding of the biological and environmental factors that contribute to it. Studies in animal models—in particular, animals whose cognitive trajectory across their life span closely tracks that of humans—can provide important insights into the factors that contribute to the accumulation of reserve and ways in which it is preserved or depleted. A better understanding of the molecular processes that underlie these elements would enhance and guide not only research but also treatment approaches to these issues. These treatment approaches may include noninvasive brain stimulation and drug treatments to promote youthfulness or combat the aging process. It is important to realize, however, that these processes occur in the context of the human experience, and studies of them must consider the complexity and individuality of each person's life.

Keyword: Epigenetics; Intervention; Novel approaches; Regeneration; Reserve; Resilience