

Errata Sheet

Agriculture and Plant Sciences

P1.35

INTEGRATION OF PHYSICAL AND CHEMICAL TACTICS FOR MANAGING *Systema frontalis* [F. (Coleoptera: Chrysomelidae)] AT ORNAMENTAL NURSERIES

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The Red-headed Flea Beetle [*Systema frontalis* (F.); RHFB] is native to the central and eastern U.S. and has become a costly multivoltine pest of containerized nursery plants. We tested discs of long-lasting insecticidal netting (LLIN) secured over rims of plant containers in spring of 2023, using four species of host plants: azalea (*Rhododendron* sp.), *Hydrangea paniculata*, *Itea virginica*, and *Rosa* sp. Feeding damage ratings were assigned to bi-weekly overhead digital images of each plant by a panel of observers, with mean flea beetle damage scores used to test differences among treated vs. untreated control plants over time. While there were no significant differences in mean feeding damage ratings between treated and untreated control plants, there were lower damage ratings for one LLIN treatment during the last 2 months of the field trial, providing evidence for a potential reduction in damage from the second generation of flea beetles. These preliminary data show the potential for LLIN as an RHFB management tool; with several improvements in experimental design, this research could provide nursery producers improved pest management efficacy while reducing intensity of insecticidal sprays.

Errata Sheet

Chemistry

P4.35

2D-BASED WATER PURIFICATION MATERIALS VIA NANOARCHITECTURE

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Having safe drinking water is one of the chief challenges for modern society. Water, an essential nutrient, claims majority of the surface of our planet, and fatefully, our bodies. Used in biological and materials processing daily, it is a proven invaluable resource, with its protection is of the highest priority. As per the World Health Organization (WHO), billions of people are lacking drinking water that is free from viruses, toxic chemicals, and bacteria. The development of a water filtration systems using two-dimensional (2D) nanomaterials will deliver robust solution, adsorbing bioaccumulating toxins from the environment. Due to having atomically thin surfaces and good mechanical strength, 2D graphene, graphene oxide, and transition metal dichalcogenides are considered “advanced” membrane materials; these novel membranes have dynamic capabilities for separating toxic chemicals and pathogens.

P4.36

CELL-PENETRATING PEPTIDE MODIFIED EXOSOMES ARE SUPERIOR TO THEIR UNMODIFIED COUNTER PARTS IN DELIVERING DRUG TO BREAST CANCER CELLS

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Exosomes exhibit significant potential as carriers for drug delivery in challenging cancers such as metastatic breast cancer. Our previous research has demonstrated that exosomes achieve higher intracellular drug concentrations compared to liposomes. To further optimize the drug delivery capability of exosomes, specifically Paclitaxel (PTX), we have introduced a modification using RGD-peptide with cell-penetrating properties. Importantly, our findings show that the size of the exosomes remains unchanged after the introduction of the RGD peptide. Additionally, we conducted a thorough analysis of the drug release profiles of RGD peptide-modified exosomes at different pH levels. The results indicate that the drug release pattern aligns closely with that of unmodified exosomes. In vitro cytotoxicity studies targeting breast cancer cell lines MDA-MB-231 and MCF-7 reveal the superior efficacy of RGD peptide-modified exosomes in inhibiting cancer cell growth. HPLC analysis of intracellular drug levels in treated cancer cells indicates that the group receiving RGD peptide-modified exosomes exhibits higher levels within the cells, attributable to the cell-penetrating properties of the modified exosomes. Our experiments provide compelling evidence that the modification of exosomes with a cell-penetrating peptide is a desirable strategy for achieving enhanced therapeutic outcomes.

P4.37

DESIGN OF 1D-0D HETEROSTRUCTURES BASED PHOTOCATALYST USING WO₃ NANOWIRE-GOLD NANOPARTICLES

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Errata Sheet

Health Sciences

P7.41

NAFLD PATIENTS AT AN INCREASED RISK FOR ABNORMAL BONE DENSITY?

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Undergraduate

Background: Osteoporosis is a common silent disease that is frequently underdiagnosed and undertreated until a fracture occurs. Approximately 10 million Americans have osteoporosis and are at risk for an osteoporosis-related fracture with an estimated annual cost of \$17 billion. Osteoporotic hip fractures have a 10% mortality rate at 1 year, and 50% of people with an osteoporotic fracture never underwent bone density screening. A common co-existing condition of osteoporosis is non-alcoholic fatty liver disease (NAFLD). NAFLD is currently the most common liver disease globally, estimated to affect 25% of the population. NAFLD's natural history includes progressive liver injury and increased morbidity and mortality related to liver and cardiovascular events. Although Osteoporosis and NAFLD are a common coexisting condition in many people, how they relate to one another has not been studied. There are >60 million CT scans conducted annually in the U.S. that include the spine. There is bone density information on all CT images which include images of the spine and thereby information on bone density. The objective of our study was to evaluate how an increase in NAFLD index relates to bone density. **Methods:** This retrospective single-center observational study included 563 patients of age 18 and above in both sexes with a diagnosis of NAFLD with non-contrast or contrast and non-contrast CT imaging from January 1, 2004, to June 30, 2016. Attenuation measurements of the right lobe of the liver, left lobe of the liver, spleen, portal vein, IVC, aorta, L1 vertebrae, and L2 vertebrae were made using circular Region-of-Interests (ROI) on non-contrast imaging, portal venous imaging, arterial phase imaging, and delayed phase imaging. NAFLD clinical index was calculated from serum laboratory values. Linear Regression analyses were conducted to determine the associations with L1/L2 bone attenuation and NAFLD clinical index and L1/L2 bone attenuation and liver attenuation. Regression coefficients of Beta weights and odds ratios were also calculated to understand the effects of bone density on NAFLD clinical index and liver attenuation. Inter-class correlation coefficient (ICC) values were also calculated to determine interobserver and intra-observer agreements of all measurements conducted. **Results:** Trabecular bone attenuation at L1 and L2 was inversely proportional to NAFLD clinical index. The odds ratio for bone density indicated that every unit increase in NAFLD clinical index was associated with a 19% increase in the odds of low BMD at L1 and 21% increased odds of low BMD at L2 using the attenuation cut-off point 145 HU for normal and abnormal bone density. For every 1 unit increase in NAFLD Clinical Index, there was a decrease in trabecular bone attenuation of 5.5 HU at L1 ($\beta = -5.50$; 95% CI: -8.48 to -2.53, $p < 0.001$) and 4.91 HU at L2 ($\beta = -4.91$; 95% CI: -7.90 to -1.92, $p = 0.001$). Prior studies have validated bone attenuation from CT as an accurate measure of quantitative bone density surrogate. Selection bias in the retrospective study design is a possible limitation. This study is one of the first to produce associations between NAFLD and bone density in a moderately sized NAFLD cohort. CT attenuation bone density surrogate may have the potential to clinically monitor NAFLD patients for the risk of osteoporosis-related fracture. **Conclusion:** Our results support the hypothesis that there is a strong association between NAFLD and bone mineral density. The worsening of NAFLD as defined by the NAFLD index correlated with decreased bone mineral density.

Errata Sheet

Health Sciences

P7.42

RETROSPECTIVE VALIDATION OF A RAPID BONE DENSITY SCREENING METHOD THAT IS APPLICABLE TO ROUTINE MULTIPHASIC ABDOMINAL CT IMAGES

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Background: Non-alcoholic fatty liver disease (NAFLD) is the most common liver disease in the Western world, affecting 20-30% of Americans. NAFLD and obesity have both been correlated to a higher risk of having low bone mineral density (BMD) among patients. Low BMD can be indicative of osteoporosis. Osteoporosis is a common silent disease that is frequently underdiagnosed and undertreated until a fracture occurs. Approximately 10 million Americans have osteoporosis and are at risk for an osteoporosis-related fracture. Osteoporotic hip fractures have a 20-40% mortality rate at 1 year, and 50% of people with an osteoporotic fracture never underwent bone density screening. There are >60 million CT scans conducted annually in the U.S. that include the spine. There is bone density information on all CT images which include images of the spine, but rapid methods for extracting the bone density information are lacking. A rapid and accurate opportunistic method to screen for abnormal bone density of the spine on abdominal CT images with contrast could substantially improve screening efforts for abnormal bone density with no additional cost or radiation exposure for the patient. Our objective was to retrospectively validate an opportunistic bone density screening method based on differential colorization of normal vs. abnormal spinal bone density on routine abdominal CT images that include L1 and L2 vertebrae with multiphasic CT images. **Method:** This retrospective single-center observational study included 546 patients of age 18 years and above in both sexes with a diagnosis of NAFLD and had Portal Venous, Arterial, and/or Delay CT scan within 6 months of Non-contrast scan imaging from January 1, 2004, to June 30, 2016. L1 & L2 bone mean attenuation (HU) was measured in nonenhanced and portal venous contrasted CT images, and nonenhanced image attenuation measurements served as the reference standard for bone density. From prior studies, ROC analysis was used to find the optimal mean attenuation cut point for differentiating normal (>145 HU) from abnormal (<145 HU) bone density. An off-line, post-processing PC software (Color Enhanced Detection Software) was used to convert 1.25mm axial abdominal CT images into straightened midline thick-slab (20 mm) paired grayscale and colored images of both non-contrast and portal venous scans. The established cut point was used to create a color palette to color normal bone density green and abnormal bone density red. The straightened midline thick-slab paired grayscale and colored images were de-identified, exported, and uploaded onto an image viewer (Osirix, DICOM Viewer). Linear regression analyses were conducted to determine the associations between L1 and L2 mean bone attenuation on non-contrast and portal venous contrast images. ROC curves for L1 and L2 mean attenuation measurements on non-contrast and portal venous contrast CT images were generated. **Results:** Mean attenuation measurements at L1 and L2 on portal venous CT scans had a very strong agreement with non-contrast mean attenuations at L1 and L2 (L1 R²= 0.97; L2 R²=0.84). The mean attenuation measurements had an accuracy of 85%, sensitivity of 70%, and specificity of 99% at L1 and an accuracy of 83%, sensitivity of 69%, and specificity of 98% at L2. This study used a retrospective design, a moderate sample size, a true screening patient population, and multiple readers. This study conflicts with many other studies stating that portal venous scans increase bone attenuation by 10-20 HU but could be due to the disease process of NAFLD. The study did not directly assess future fracture risk. A multi-reader retrospective study will be conducted using the CED software to assess the BMD in both non-contrast and portal venous CT scans using the correction factor of 0.87 for L1 and 0.84 for L2. **Conclusion:** Excellent correlation with bone attenuation across the spectrum portal venous, arterial, and delay with accuracy ranging from 75-94% and an R² value greater than 0.80 which suggests that BMD does not change on the phase of contrast in this NAFLD population.

Errata Sheet

Health Sciences

P7.43

AN EXAMINATION AND REVIEW OF LEGIONNAIRES' DISEASE

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The bacterium *Legionella pneumophila* was initially identified in 1977. Annually, approximately 6,000 cases of Legionnaires' disease are reported in the United States. Furthermore, it is estimated that around 25,000 individuals in the United States contract Legionnaires' disease each year. Moreover, there exists an undisclosed number who become infected with the *Legionella* bacterium, experiencing mild symptoms, or even remaining asymptomatic. On August 9, 2023, two workers were diagnosed with Legionnaires' disease at the Stellantis truck plant in Warren, Michigan. Responding swiftly, the Stellantis truck plant acted by suspending three water test operations. The company promptly assembled a team of experts to thoroughly examine water sources and conduct a comprehensive cleaning of the water test operations. In a similar incident last December, nine cases of confirmed Legionnaires' disease emerged in the Daxi district of Taoyuan special municipality, garnering significant public attention, though thankfully no fatalities. In Taiwan, the Taiwan Center of Disease Control reported 370 cases of infection for the year 2022. These cases are sporadic in nature. If left untreated, Legionnaires' disease typically exacerbates within the initial week. Like other risk factors associated with severe pneumonia, the predominant complications include respiratory failure, shock, acute kidney issues, and multi-organ failure. Recovery mandates antibiotic treatment, which generally concludes after several weeks or months. However, in rare instances, progressive pneumonia or inadequate pneumonia treatment can lead to subsequent brain-related issues. Statistically, approximately 1 in 10 individuals afflicted with Legionnaires' disease succumb due to complications stemming from the illness. Within healthcare facilities, the fatality rate is even higher, with roughly 1 in 4 individuals passing away if they contract the disease during their stay. The purpose of this paper is to review existing materials and raise awareness regarding the importance of effective water management programs.