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2051 Protective Role of Brown Seaweed *Cystoseira baccata* Extract against an Induced Oxidative Stress in Caco-2 Cells

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Brown seaweeds (class *Phaeophyceae*) are a well-known source of polyphenols. *Cystoseira baccata* is an eastern Atlantic macroalgae specie. The study objective was to investigate the potential cytotoxicity and the antioxidant activity of polyphenolic compounds extracted from *C. baccata* in Caco-2 cells. The total phenolic content extracted in aqueous media was 2.28 ± 0.03 mg/g fresh algae. The possible cytotoxic effect of the aqueous/phenolic extract on cell viability was measured by quantitative colorimetric MTT assay and on oxidative damage [reactive oxygen species (ROS) production and caspase-3 activity] was also evaluated. Exposure of the extracts aqueous/phenolic (10, 50, 100, 250, 500 µg/mL) evoked no changes in cell viability and caspase 3 activity. Exposure of the extract at concentrations of 250 and 500 µg/mL evoked a reduction of ROS production (15.5% and 20%, respectively) compared to control. Then, we investigated the potential protective effects of the extract against an oxidative stress induced by tert-butil hydroperoxide (t-BOOH) in Caco-2 cells. Treatment with t-BOOH, significantly in a dose-dependent manner, evoked MTT reduction, and increase of ROS levels and caspase 3 activity. Treatment with the extract (100-500 µg/mL) entirely prevented the MTT reduction caused by t-BOOH and caused a significant reduction, dose-dependent, of the oxidative damage induced by t-BOOH. Increases in ROS generation (334%) and caspase-3 activity (41%) induced by t-BOOH were significantly reduced (17-28%, and 24-26%, respectively) when cells were pretreated with the extract (100, 250 and 500 µg/mL). The results showed that treatment of Caco-2 in culture with the extract aqueous/phenolic from *C. baccata* confers a significant protection against the oxidative insult. These findings support the use of the extract aqueous/phenolic from *C. baccata* for potential nutraceuticals purposes. *Work supported by Project Ref. RTA2015-00010-C03-03 from Ministerio de Economía, Industria y Competitividad (Spain) and CERCA Programme, Generalitat de Catalunya (Spain).*

2052 Validation and Utilization of Poultry Microsomes for the Evaluation of Drug-Drug Interactions

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Drug residues are a concern in poultry as their occurrence can cause negative effects such as antibiotic resistance or toxicity to humans. Maximum Residue Levels are established for veterinary drugs to ensure appropriate levels of residues are met for human consumption. Extra-label use of drug combinations in poultry feed can result in drug-drug interactions (DDIs) and altered drug metabolism affecting projected drug residue levels. *In vitro* systems have been used to evaluate DDIs for regulatory approval, but these systems have yet to be explored in poultry. The objective of this study is to use incubations of liver microsomes from poultry as a high-throughput method for determination of potential DDIs in common extra-label poultry drug combinations. Liver tissue was collected and microsomes were prepared from the livers of 4-6-week-old dual-purpose chickens. The mRNA levels of CYPs most associated with xenobiotic metabolism i.e. CYP1A4, CYP1A5, CYP2C23, CYP2C45 and CYP3A37 were measured by RT-qPCR with CYP2C23 showing 3-15-fold higher expression levels compared to other CYP proteins. Enzyme activity of CYP1A4/5, CYP2C23 and CYP3A37 was demonstrated using luminogenic assays. Inhibition of microsomal CYP2C23 and CYP3A7 activity was shown using α-naphthoflavone and ketoconazole, respectively, with percent inhibition measured to be 37.3% in CYP2C23 and 29.5% in CYP3A37. Drug-drug interactions were assessed by monitoring drug depletion in microsomal incubations using LC-MS. Drugs of interest to the poultry industry, monensin and fenbendazole, were incubated either alone or in combination with concentrations of 1uM and 10uM for the effector and inhibitor drug, respectively. Incubation medium was sampled at 0, 10, 20, 30 and 40 minutes, and drug concentrations were analyzed by mass spectrometry. Linear regression analysis was used to calculate changes in drug depletion rates resulting from drug-drug interactions. Preliminary results show no change in the rate of fenbendazole metabolism in the presence or absence of Monensin, while Monensin metabolism was 15% slower in the presence of Fenbendazole. The long-term objective is to use microsomes and LC-MS to screen drug combinations of interest to the poultry industry for potential drug-drug interactions.

2053 Malignancy-Linked Cell Signaling Network in Deoxynivalenol-Exposed Mucosal Niche

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Foodborne trichothecenes trigger protein kinase R (PKR)-mediated integrated stress response. PKR expression positively associates with poor prognoses for colorectal cancer (CRC) patients. We identified PKR-linked Wnt signaling networks that facilitate early inflammatory niche and epithelial-mesenchymal transitions of tumor tissues in response to deoxynivalenol (DON). However, the downstream Wnt signaling target fibrogenic connective tissue growth factor (CTGF) regulates the nuclear translocation of β-catenin in a negative feedback manner. Moreover, dwindling expression of the Wnt/β-catenin pathway-regulator CTGF triggers noncanonical Wnt pathway-mediated exacerbation of intestinal cancer progression such as an increase in cancer stemness and acquisition of chemoresistance in the presence of DON. The Wnt-CTGF-circuit-associated landscape of oncogenic signaling events was verified with clinical genomic profiling. This oncogenic signaling network during DON exposure provides valuable insight into potential molecular interventions against intestinal malignancies. *This research was supported by the Basic Science Research Program through the National Research Foundation of Korea (NRF) funded by the Ministry of Education (2018R1D1A3B05041889) and Ministry of Science and ICT (NRF-2019R1A2C1084827).*

2054 Development of User-Friendly Diagnostic Kit for Detection of Sulphonamide Residues in Dairy Milk

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Antibiotic residues in food of animal origin pose a serious threat to public health. The sophisticated techniques to monitor drug residues are time consuming and expensive. Lateral flow assays (LFA) are quick residue detection techniques used for screening of biological fluids such as milk, urine, or blood that give quick and reliable results. A rapid and efficient lateral flow assay based strip has been developed to detect sulphonamides in dairy milk. This kit is made using nanotechnology following the competitive format principle of LFA. Primary antibodies were raised in rabbits against hapten (Sulphanilamide-BSA) and purified by Octanoic acid-ammonium sulphate (OA-AS) sequential method. Total protein (IgG) was measured by nanodrop spectrophotometer and specificity of purified antibodies was evaluated by direct ELISA. Gold nano-particles were synthesized by citrate reduction method, characterized and were conjugated with primary antibodies. The nitrocellulose membrane (NC) membrane of strip was divided into control and test lines. The immunogen (Sulf-Ova) was smeared on test line and secondary antibodies were smeared on control line. The gold-nanoparticle conjugates were impregnated on the conjugate pad. LFA using polyclonal antibodies and nanotechnology for the detection of sulphanilamide in biological fluids has been demonstrated and the developed assay could detect MRL values (100 ppb) in milk. The visual detection was achieved by using gold nanoparticles. Duration of analysis was 8 to 15 min. These strips are easy to use and can find application for screening of sulfonamides in dairy milk.

2055 Functional Comparison of Dietary Early Glycation Products Produced through Spray-Drying and Freeze-Drying Methods

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Early glycation products (EGPs) are proteins modified with reducing sugar moieties in the first two steps of Maillard reactions. Our preclinical studies revealed that EGPs derived from whey protein isolate (WPI) and glucose through the freeze-drying (FD) method were anti-inflammatory, implying a nutraceutical application for chronic inflammatory conditions. Spray-Drying (SD) is a well-established industrial method used in transforming liquid food products into powder form. Our preliminary LC-MS study revealed that the SD procedures resulted in some glucose moieties' attachment, and the reaction degrees for EGPs-SD were slightly higher than EGPs-FD. This study aims to determine if EGPs-SD increases glucose metabolism and decreases insulin resistance in the glucose (GTT) and insulin (ITT) tolerance tests as reported for EGPs-FD in a murine model. NOD-EF male mice were gavaged with water (Vehicle control), non-reacted (NR; WPI + Glucose) control, SD control (Spray-dried powder incubated for 0 hours), and EGPs-SD (incubated for 8 hours) at 600 mg/kg body weight/day. GTT was conducted after dosing for eight weeks, and the measurement of blood glucose levels (BGLs) revealed that SD control induced non-significant changes at all time points compared to the BGLs in NR control mice. In contrast, the BGLs of EGP-SD mice were signifi-

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