treatment ($p = 0.012$), and remained at similar, decreased levels after chemotherapy.

Conclusions: Levels of IL-8 and VEGF, but not IL-17, are elevated in tumor tissue compared to normal surrounding tissue in CRC. Serum IL-8 decreases after surgery, and VEGF decreases after FOLFOX adjuvant chemotherapy in CRC.

55ASM-0031 FT | Relationship between neuronal activity in whole-cell and cell-attached current-clamp modes

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Background: Cell-attached current-clamp recordings have been proposed for measuring neuronal resting membrane potential and synaptic responses. However, the accuracy of cell-attached current-clamp recordings in neurons remains unknown.

Materials and Methods: We used concomitant dual cell-attached and whole-cell current-clamp recordings from the soma of cortical L5 neurons in slices of the mouse somatosensory cortex to directly estimate accuracy of cell-attached current-clamp recordings.

Results: We found that the values of resting membrane potential and the magnitude of membrane potential shifts induced by current steps through the whole-cell pipette or by bath-applied high-potassium solution were similar during cell-attached and whole-cell recordings. However, the resting membrane potential values were slightly more negative and more variable during cell-attached recordings. Also, fast signals were attenuated in amplitude (synaptic potentials, by two-fold, and action potentials, by five-fold) and slowed down in cell-attached recordings. We developed a mathematical model describing signal transformation during cell-attached recordings. The model considers resistance and capacitance of the membrane patch under the electrode tip, pipette capacitance and leak resistance at the contact between the pipette and cell membrane, and it shows reliability of cell-attached current-clamp recordings for assessment of the resting membrane potential and its slow shifts as well as distortions introduced by the complex filter during measurements of fast events such as synaptic potentials and action potentials.

Conclusions: Cell-attached current-clamp recordings provide relatively accurate estimates of the resting membrane potential and slow membrane potential shifts but significantly attenuate and slow down fast events including synaptic and action potentials. The proposed model can describe distortions caused by pipette-membrane contact in cell-attached recordings.

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55ASM-0038 FT | Pre-neoplastic lesions associated with liver and colon responses to 1,2-dimethylhydrazine in an animal model of colorectal cancer

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Background: The high incidence and mortality of colorectal cancer (CRC) combined with the lack of an effective method for early diagnosis and effective treatments make CRC one of the most relevant cancers to be studied. Thus, our work aims to study the spectrum of liver and colon lesions induced in rats by the 1,2-Dimethylhydrazine (DMH).

Materials and Methods: Twenty-nine male Wistar rats were randomly divided into two control groups (CTRL1 ($n = 6$) and CTRL2 ($n = 6$)) administrated with ethylenediamine tetraacetic acid (EDTA)-saline; and two induced groups (CRC1 ($n = 8$) and CRC2 ($n = 9$)) administrated with DMH (40 mg/kg) for 7 consecutive weeks. The CRC1 and CTRL1 groups, and the CRC2 and CTRL2 groups were sacrificed 11 and 17 weeks after the first administration, respectively. A complete necropsy was performed. Liver and colon samples of all animals were collected, fixed in formalin, and processed for histopathological analysis. The animals' blood and a small portion of the liver were collected to analyze serum markers of inflammation and to validate chemical induction through the comet assay, respectively.

Results: Half of the animals belonging to the CRC1 group presented mild to moderate dysplasia foci ($n = 3$) in the colon. The incidence of neoplasia was only 16.7% ($n = 1$) in the CRC2 group. Moreover, one animal from the CRC2 group also exhibited severe dysplasia and two presented mild to moderate dysplasia foci. Inflammatory lesions in colon samples were present in all animals from CRC groups. Although the animals showed local inflammation, there was no evidence of systemic inflammation (normal CRP and IL-6 serum levels).

Lymphoid inflammatory aggregates were observed in the liver of all animals. Furthermore, DMH induced other changes, such as hepatocyte megalocytosis and single-cell necrosis. Results from liver comet assay showed a lower genetic damage index

in control groups when compared to DMH-exposed groups ($p < 0.05$), *i.e*. DMH induced DNA damage in rats' liver.

Conclusions: Once animals showed predominantly preneoplastic lesions, our data suggest that the disease was at an early stage. In the future, we intend to change the dose of the carcinogen and the time of exposure to observe advanced stages of CRC development. We consider that this model is useful in the study of CRC chemoprevention associated with local inflammation.

55ASM-0041 FT | Indicators of pain sensitivity of rats under the action of coordination compounds of acetylsalicylic acid with metals nickel, cobalt and zinc

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Background: The aim of the study was to compare the pain sensitivity (PS) of rats with intraperitoneal injection of acetylsalicylic acid (ASA) and salicylates of nickel ($ASNi^{2+}$), cobalt ($ASCo^{2+}$), zinc ($ASZn^{2+}$)and manganese ($ASMn^{2+}$).

Materials and Methods: The study was carried out on 105 healthy adult male Wistar rats weighing 180-200 g. Registration of PS indicators was carried out in the "tail-flick" test using LE7106 Tail-flick Meter (Panlab Harvard Apparatus, Spain), where the perceptual component of pain was assessed. The main indicator of this test was the time latency of the tail with drawal response (TLTWR) caused by light-to-thermal irritation. In the "hot plate" test (Cold and hot plate CHP, Bioseb, France), the time latency of pain reaction (TLPR) was recorded. TLPR was determined by the time value (s) first manifestation of withdrawing reaction and licking limbs and/or vocalization.

The rats PS parameters were tested after 20 minutes intraperitoneal (i.*p*.) administration of compounds at doses of 5, 10 and 20 mg/kg in the models of acute pain stress "tail-flick" and "hot plate".

Results: Analysis of the results of the study showed that ASA exhibits an analgesic effect at a dose of 20 mg/kg. At the same time, TLTWR increased by 114.44% ($p \leq 0.01$) in the "tail-flick" test, and TLPR increased by 91.96% ($p \leq 0.01$) compared to control (i.p. NaCl 0.9%, volume 0.2 ml) in the "hot plate" test. $ASCo^{2+}$ only at a dose of 20 mg/kg significantly changed the PS of rats. TLTWR increased by 91.62% ($p \leq 0.01$) and TLPR by 84.46% ($p \leq 0.01$) compared to the control.

$ASNi^{2+}$ at a dose of 5 mg/kg increases TLTWR by 35.00% ($p \leq 0.01$), and at a dose of 20 mg/kg increases TLPR by 66.17% ($p \leq 0.01$) compared to control.

$ASZn^{2+}$ at a dose of 10 mg/kg increases TLTWR by 58.80% ($p \leq 0.01$) and TLPR by 43.92% ($p \leq 0.01$) compared to control. $ASMn^{2+}$ led to a slight increase in pain resistance in the "tail-flick" and "hot plate" tests, but the changes were not significant.

Conclusions: ASA and its compounds with the metals Co^{2+}, Ni^{2+}, Zn^{2+} reduce the PS of rats at the spinal and supraspinal levels. The introduction of nickel, cobalt, zinc and manganese into the ASA molecule leads to a decrease in the antinociceptive action of ASA. It can be concluded that such a chemical modification of ASA has no prospects for creating antinociceptive agents.

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55ASM-0043 FT | Structural incites in stability and activity of immobilized cysteine proteases by molecular docking and FTIR spectroscopy

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Background: Bromelain, papain, and ficin (EC 3.4.22) are used to improve digestion, relieve swelling of soft tissues, and also to speed up their recovery from injury. However, they are of limited use due to their short half-life and high isolation and purification costs. Increasing the stability of enzymes can solve these problems. Immobilization on insoluble polymers can increase the rigidity of the enzyme molecule and increase its stability. The aim of this work is to identify the adsorption mechanisms of bromelain, papain, and ficin on chitosan.

Materials and Methods: We have performed molecular docking in order to investigate the interaction between the chitosan and the enzymes. In addition, the structural changes in bromelain, papain, and ficin after immobilization were determined using FTIR.

Results: We reveal that the sorption of cysteine proteases on chitosan is realized by protein regions located on the border of domains L and R, including the region of enzyme active site. Despite the fact that bromelain, papain, and ficin are highly homologous proteins, the mechanisms of their immobilization on a chitosan matrix seem to be significantly different. The