respectively). Since the membranotropic properties of terpenes were reported, we investigated their effect on cell membranes. The presence of both (-)-Myrtenol and (+)-Myrtenol led to a dose-dependent drop of the membrane potential of S. aureus cells, similarly to Benzalkonium chloride, suggesting that the membrane damage could be the possible mechanism of terpenes action.

Conclusions: The observed synergy of Myrtenol in combination with amikacin on a wide range of clinical isolates proposes synergy on other aminoglycosides to be investigated and open promising perspectives to increase the antimicrobial treatment efficacy.

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55ASM-0085 FT | Treatment of Candida albicans - Staphylococcus aureus mixed biofilms by novel 2(5H)-furanone derivative

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Background: Mixed *Candida albicans - Staphylococcus aureus* biofilms exhibit increased tolerance to conventional antimicrobials and are strongly implicated in persistent infections with high morbidity and mortality. Here we show that newly synthesized 2(5*H*)-furanone derivatives carrying either *l*-menthol (F105) or *l*-borneol (F131) moieties can be used to increase the treatment efficiency of *S. aureus-C. albicans* mixed biofilms. Furthermore, the combined use of antimicrobial drugs is widely used, which increases the overall antimicrobial efficacy and also reduces the likelihood of developing antibiotic resistance. Therefore, we also aimed to establish the degree of synergism of (F105) and (F131) with various groups of antibiotics and antimycotic agents.

Materials and Methods: The novel furanone derivatives F105 and F131 were synthesized at Kazan Federal University (Kazan, Russia). Fungal and bacterial strains were obtained from a collection of clinical isolates at the Kazan Institute of Microbiology and Epidemiology (Kazan, Russia). Fluconazole and Gentamicin were used as reference antimycotic and antibacterial compounds, respectively. The viability of fungal and bacterial strains was evaluated by differential CFUs count. MIC was determined by serial microdilution approach. The synergy of antimicrobials was evaluated in checkerboard assay.

Results: Both F105 and F131 exhibited MICs 8-64 μg/mL and were capable of suppressing the formation of biofilms as well as eradication of the formed biofilms. Furanone derivatives exhibited synergetic effect in combination with benzalkonium chloride, fluconazole and terbinafine with a FIC index of 0.5.

Conclusions: These compounds exhibit a promising antibacterial activity and antifungal activity against *S. aureus*/*C. albicans* mixed biofilms. In addition, the novel furanone derivatives F105 and F131 increase the efficiency of antimicrobials against mixed species biofilms *in vitro,* and appear to be an attractive starting point for the development of alternative drugs for the treatment of skin infections caused by candida mixed biofilms.

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55ASM-0087 FT | The bacterial susceptibility to various antimicrobials in S. aureus – K. pneumonia mixed biofilm

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Background: Being in biofilms, bacteria become extremely resistant to antimicrobials and immune system of the host because of diffusional barrier of the extracellular matrix synthesized by cells themselves. The composition of the matrix unique for each bacterial species, moreover, significant changes are observed in mixed culture in compare with monocultures of the same microorganisms affecting both the morphological structure of the biofilm and susceptibility of bacteria within the biofilm to antimicrobials.

Materials and Methods: *S. aureus – K. pneumonia* mixed biofilm was grown for 48 hours under static conditions. Bacterial viability was assessed by differential CFUs count. The biochemical composition of the biofilms matrix was determined by using fluorescent dyes.

Results: Here we show that in mixed culture of *S. aureus – K. pneumonia* the biofilm matrix became thicker in compare with the biofilms of monocultures as judged with Congo Red stain. The analysis of biochemical composition confirmed that the absolute content of α- and β- polysaccharides increased in the polymicrobial biofilm, while the level of extracellular DNA and proteins did not change significantly. Despite of that, in mixed biofilm, the addition of vancomycin and ciprofloxacin lead to decrease of the viable cells of both strains by 3 orders of magnitude at 8× and 1×MBC, respectively. While in monocultures bacteria embedded into the biofilm remained insensitive to antibiotics up to their 16×MBC. Moreover, the addition of a cell-free culture fluid of *S. aureus* in combination with either vancomycin or ciprofloxacin led

to significantly faster death of biofilm-embedded *K. pneumonia* in compare with solely antimicrobials.

Conclusions: The data observed suggest significant variations in bacterial susceptibility to antimicrobials in *S. aureus – K. pneumonia* mixed biofilm that should be taken into account. Moreover, while an exact metabolites providing increase of bacterial susceptibility in multispecies communities remain to be identified, these findings open promising perspectives to increase the antimicrobial treatment efficacy of the biofilm-associated infections.

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55ASM-0088 FT | Features of hematological and biochemical blood parameters in patients with COVID-19

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Background: The aim of the work is to identify the features of hematological and biochemical blood parameters in patients with COVID-19 compared to practically healthy individuals.

Materials and Methods: The study in December 2020 involved newly admitted adult patients-volunteers (age 35-65 years) and diagnosed with COVID-19 ($n = 11$) at the Krasnogvardeysky District Hospital of the Republic of Crimea (Russia) and conditionally healthy volunteers (CHV) without it ($n = 11$). From 8 to 9 o'clock in the morning, whole venous blood was taken and tests were performed on the equipment of the Clinical and Diagnostic Laboratory. The analysis of 22 parameters of whole venous blood was performed on the hematological analyzer ERBA Elite 3 (ERBA Lachema, Czech Republic). The erythrocyte sedimentation rate (ESR) was also determined. In the blood serum of patients of both groups, a biochemical blood test was performed on an automatic biochemical analyzer ERBA XL-600 (ERBA Lachema, Czech Republic). The level of total protein, urea, creatinine, glucose, triglycerides, total bilirubin and the activity of aspartate aminotransferase and alanine aminotransferase were determined. Statistical data processing was performed using the Mann-Whitney U Test.

Results: In patients with COVID-19, an increase in the number of white blood cells by 171.40% ($p < 0.001$, $n = 11$) was found in whole venous blood compared to CHV, mainly due to an increase in the number of granulocytes by 287.41% ($p < 0.001$, $n = 11$). There was also a significant increase ESR by 314.29% ($p < 0.001$, $n = 11$). This indicates an active infectious pathological process. Among the indicators of biochemical analysis in the blood serum of patients with COVID-19 compared with CHV, there was a significant increase in glucose levels by 16.92% ($p = 0.0013$, $n = 11$) and a decrease in urea levels by 28.21% ($p = 0.0014$, $n = 11$) and creatinine by 79.27% ($p < 0.001$, $n = 11$). There was also an increase in the trend level of total bilirubin in the serum by 27.5% ($p = 0.053$, $n = 11$). This indicates a violation of carbohydrate metabolism and deterioration of the functional state of the liver.

Conclusions: Thus, in patients admitted to the hospital with a diagnosis of COVID-19, blood tests significantly increase the number of white blood cells due to granulocytes, ESR, glucose levels and decreases the level of urea and creatinine. Thus, the indicators of the nonspecific inflammatory process, carbohydrate and functional state of the liver are most sensitive to the new coronavirus infection in the initial period of the disease.

55ASM-0089 FT | Extracellular antibacterial compounds from novel strain Lactobacillus fermentum HFD1

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Background: The emergence of antibiotic-resistant pathogens worldwide leads to difficulties in treatment of infectious diseases. Antimicrobial peptides (bacteriocins) have promising potential in targeting the antibiotic-resistant pathogens. Bacteriocins are small antimicrobial peptides (AMPs) produced by numerous bacteria such as lactic acid bacteria (LAB). They act against pathogenic bacteria with very high potency and specificity via destruction of target cells by pore formation in membrane and/or inhibition of cell wall synthesis.

Materials and Methods: L. fermentum HFD1 strain was isolated from the faeces of healthy women. The solid-phase extraction (SPE) was used for antibacterial peptides extraction. The 24h- or 48h-old culture of L. fermentum HFD1 strain (100 ml, inoculation volume 10 ml) was stored at 25°C for 30 minutes or heated at 80°C for 30 minutes. Then the pH was adjusted to 2.0, 4.0, or 8.0, and cells were removed by centrifugation. The cell-free supernatant was loaded onto a C18 SPE column equilibrated with acetonitrile and