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Bachelorprojekt

Titel på bachelorprojekt
Differentiering af alpha og non hæmolytiske Mitis og Sanguinis gruppe Streptococci ved anvendelse af en automatiseret galdeopløselighedstest o g MALDI TOF MS

Abstract - kopieres fra bachelorprojekt
Identification of alpha- and non-hemolytic Mitis-group Streptococci, including the highly pathogenic Streptococcus pneumoniae, consist of several different phenotypic methods. These methods, however, may lead to misidentification, due to subjectively based interpretation and occurrence of atypical phenotypic features among the species. The risk of misidentification, combined with the uncertain pathogenic potential of the newly discovered Streptococcus pseudopneumoniae, constitute the need for an accurate and reliable method, for the identification and differentiation of Mitis-group Streptococci. Matrix-assisted Laser desorption/ionization time-of-flight mass spectrometry(MALDI-TOF MS), provides rapid and reliable species identification of many bacterial isolates, and improvements of the MALDI Biotyper database and characterization of species specific peaks, may enhance the ability of identification of Mitis-group Streptococci as well. Therefore, the aim of this study was to evaluate the accuracy of identification and differentiation of Mitis-group Streptococci, by a combination of methods, based on an alternative and automated bile solubility test, and MALDI-TOF MS identification, by both the standardscore and visual inspection of peaks. 203 Mitis- and Sanguinis-group Streptococci, was included in the study, and optimal cut-off values was calculated from Optical-density(OD) values obtained from performing an alternative bile solubility test, using a densitometer(OD control minus OD test). Optimal cut-off values were combined with both MALDI-TOF MS standardscore and visual inspection of peaks and compared to species identification based on seven housekeeping genes and whole genome sequencing. The results showed that an optimal cut-off value of 2.29, for the differentiation of S. pneumoniae and S. pseudopneumoniae, indicated 100% sensitivity and specificity. A sensitivity of 100% and specificity of 94,95%, was obtained for differentiation of S. pseudopneumoniae, from other non-pneumococcus Mitis- and Sanguinis group Streptococci, by an optimal cut-off value of 0.61. Combined with MALDI-TOF MS 73 S. pneumoniae strains, all but one S. pseudopneumoniae strain, and 78 non-pneumococcus Mitis- and Sanguinis-group Streptococcus strains, was identified correctly using the standardscore identification. Visual inspection of peaks identification correctly identified a total of 47 of the Mitis- and Sanguinis-group Streptococcus strains. In conclusion, the combination of MALDI-TOF MS standardscore and the calculated optimal cut-off values, resulted in species identification and differentiation of Mitis-group Streptococci, of higher quality than visual inspection of peaks. Implementation of the automated workflow might contribute to a less demanding workload and benefit public health.

Motivation

Bachelorprojektet "Differentiering af alpha- og non-hæmolytiske Mitis- og Sanguinis-gruppe Streptococci ved anvendelse af en automatiseret galdeopløselighedstest og MALDI-TOF MS" tager udgangspunkt i grundforskning af en velkendt problematik, hvor der er arbejdet selvstændigt med komplekse softwareprogrammer (Biotyper og Flexanalysis), statistiske metoder (R software) og selvstændig udvikling af metodedesign herunder et validt og innovativt forslag til implementering i bioanalytikerpraksis.

I projektet belyses bl.a., hvordan udvidelse af bioanalytikerens kompetenceområder, som f.eks. forskningsbioanalytiker i det klinisk mikrobiologiske speciale, kan bidrage til mere nøjagtig identifikation af samfundsrelevante mikroorganismer, som Streptococcus pneumoniae, sammenlignet med proceduren der anvendes i dag. Samtidig muliggøres identifikation af Streptococcus pseudopneumoniae i rutinen, hvilket kan give indblik i artens patogene potentialer, der i tidligere studier har vist sig at være af klinisk relevans, hos patienter med Kronisk obstruktiv lungesygdom.

Projektrapporten er velreflekteret, af høj faglig kvalitet og inddrager relevant national- og international videnskabelig litteratur, med omfattende resultatbearbejdning, som udmunder i en anbefaling for, hvordan identifikation af Mitis- og Sanguinis-gruppe Streptococci kan se ud fremadrettet.

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ons, 06/22/2022 - 00:00

Må projektet offentliggøres i sin helhed?
Ja

Må Danske Bioanalytikere kontakte forfatterne?
Ja