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Publication date:
2016

Document Version
Peer reviewed version

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Citation (APA):

Sørensen, M. R., Ilsøe, M., Strube, M. L., Bishop, R., & Jungersen, G. (2016). *Sequence-based genotyping of expressed SLA class I alleles by Next Generation Sequencing reveal novel SLA class I haplotypes and alleles in Belgian, Danish and Kenyan fattening pigs and Göttingen minipigs*. Abstract from 11th International Veterinary Immunology Symposium, Gold Coast, Australia.

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Sequence-based genotyping of expressed SLA class I alleles by Next Generation Sequencing reveal novel SLA class I haplotypes and alleles in Belgian, Danish and Kenyan fattening pigs and Göttingen minipigs (35808)

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The need for typing of the swine leukocyte antigen (SLA) is increasing with the expanded use of pigs as models for human diseases and organ-transplantation experiments, their use in infection studies, and for design of veterinary vaccines. Knowledge of SLA sequences is furthermore a prerequisite for the prediction of CTL epitopes based on predicted MHC binding in pigs. The low number of known SLA class I alleles and the limited knowledge of their prevalence in different pig breeds, emphasizes the need for efficient SLA typing methods.

Here we obtain SLA class I-typing and –expression based on Illumina MiSeq Next Generation Sequencing of barcoded PCR amplicons. Universal primers were designed to generate amplicons spanning exon 2 and exon 3 of the SLA class I genes and predicted to resolve 68% to 88% of all known SLA class I alleles dependent on amplicon size. Based on whole blood mRNA we analyzed the cDNA SLA profiles of 72 pigs from four different pig populations: Göttingen minipigs and Belgian, Kenyan, and Danish fattening pigs. We identified 67 different allele sequences, including 12 novel alleles, and observed 24 haplotypes of which 15 have not been described before. The highest variation in SLA class I profiles was observed in the Danish pigs and the lowest among the Göttingen minipig population, which also had the highest percentage of homozygous individuals. The identification of 12 novel SLA class I alleles from only 72 pigs highlight the fact that there are still numerous unknown SLA class I alleles to be discovered.

In conclusion, we present an NGS-based method to obtain sequence-based high-resolution SLA class I typing based on expressed alleles and provide new information about known and novel alleles and haplotypes and their prevalence in the tested pig populations.

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Keywords: Swine leukocyte antigen, MHC typing, Next Generation Sequencing, pigs, immunology.