

## Press release

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### Basic information

Name: Andreas Fløe Hvass Email: andrni@rm.dk Phone: +45 26360885

Department of: Clinical Medicine

Main supervisor: Torben Riis Rasmussen

Title of dissertation: Exploring diagnostic opportunities in active and latent TB: Stratifying transmission risk using PCR, and identification of immunogenic CD8+ T-cell epitopes

Date for defence: 21/2 - 2018 at (time of day): 14:00 Place: Patologisk Auditorium, Aarhus Universitetshospital Nørrebrogade, Nørrebrogade 44, Bygning 18, 8000 Aarhus C

Press release (Danish)

Et skridt mod bedre diagnostik af tuberkulose

Hvordan kan vi anvende diagnostiske metoder til at påvise tuberkulose mere rationelt, og kan vi i fremtiden anvende skræddersyet diagnostik til at identificere dem, der bliver syge af tuberkulose efter at være udsat for smitte? Disse emner behandles i et nyt ph.d.-projekt fra Aarhus Universitet, Health. Projektet er gennemført af Andreas Fløe Hvass, der forsvare det d. 21/2 2018.

Tuberkulose udgør fortsat en enorm sundhedstrussel på verdensplan. Mere effektiv afbrydelse af smittekæder, og bedre redskaber til at forudse hvem der vil udvikle aktiv sygdom efter udsættelse for smitte, udgør et par af de fokusområder, som kan bidrage til forbedret kontrol af tuberkulose-truslen.

I dette ph.d. projekt har Andreas Fløe Hvass anvendt nationale, danske data fra Statens Serum Institut til at vise, at det er forsvarligt at ophæve isolation af patienter under mistanke for at have tuberkulose, hvis man i én enkelt prøve ikke har fundet spor af DNA fra tuberkulosebakterier. Tidligere har man afventet svar på mikroskopi af tre forskellige prøver. Disse fund kan direkte implementeres i retningslinier for håndtering af tuberkulose-patienter, hverved man kan afkorte isolationstiden væsentligt for en stor gruppe af patienter.

Når mennesker har været udsat for tuberkulose, kan man undersøge om man er smittet ved en blodprøve. Men kun omkring 10% af de smittede udvikler aktiv tuberkulose i løbet af livet - og de nuværende tests kan ikke skelne mellem latent og aktiv sygdom, endsige forudsige hvem der på sigt vil udvikle aktiv sygdom. Nye testmetoder som kan skelne mellem latent og aktiv infektion vil effektivt kunne forebygge fremtidige tuberkulose-tilfælde.

I et fælles projekt med biotek-virksomheden Immudex ApS, med støtte fra Danmarks Innovationsfond, har Andreas Fløe Hvass og den øvrige forskergruppe omkring projektet undersøgt om såkaldte CD8-celler kan påvises direkte i blodet fra patienter med forskellige stadier af tuberkulose-infektion. Dette har givet indsigt i, hvordan immunforsvarets genkendelse af tuberkulose afhænger af menneskers vævstype, og har endvidere bidraget til at kortlægge hvilke fragmenter af tuberkulose-bakterier, som genkendes af netop denne del af immunforsvaret. Tilsammen kan denne viden anvendes til fremtidige diagnostiske tests, såvel som at bidrage til design af nye tuberkulose-vacciner i fremtiden.

Forsvaret af ph.d.-projektet er offentligt og finder sted den 21/02 2018 kl. 14 i Patologisk Auditorium, Aarhus Universitetshospital, Nørrebrogade 44, 8000 Aarhus C. Titlen på projektet er "Exploring diagnostic opportunities in active and latent TB: Stratifying transmission risk using PCR, and identification of immunogenic CD8+ T-cell epitopes".

Yderligere oplysninger: Ph.d.-studerende Andreas Fløe Hvass, e-mail: andrni@rm.dk, tlf. 26360885.

Bedømmelsesudvalg:

Trine Mogensen, Professor, afdelingslæge, Dr. Med, PhD, Infektionsmedicinsk afdeling Q, Aarhus Universitetshospital (formand)

Åse Bengaard Andersen, Professor, overlæge, Dr. Med, Infektionsmedicinsk Klinik, Rigshospitalet  
Jose Dominguez, Associate Professor, PhD, Department of Microbiology, Universitat Autònoma de Barcelona.

Press release (English)

How can we utilize current methods for diagnosis of tuberculosis in a more rational way? Will the future see tailored diagnostic tools, identifying those at highest risk of falling ill with active disease upon exposure? These topics were discussed in a new ph.d. project from Aarhus University. The project was carried out by Andreas Fløe Hvass, who is defending his dissertation on the 21st of February 2018.

Still today, Tuberculosis remains a major health issue worldwide. More effective interruption of transmission chains, and improved tools to predict development of active disease upon exposure to the disease represent two important focus areas for improved control of tuberculosis in the future.

In this project, Andreas Fløe Hvass utilized Danish nationwide data from Statens Serum Institute, Copenhagen, to show that isolation of hospitalized patients in whom tuberculosis is suspected, can safely be ceased if DNA from tubercle bacilli are not detected in a single sputum sample. Previous standards recommend awaiting the results of microscopy analysis of three consecutive samples. These findings can directly be implemented in guidelines for care of tuberculosis patients, significantly shortening time under isolation for a large group of patients.

Upon exposure to tuberculosis, a blood test is routinely used to detect if the person in question is actually infected. However, only approx. 10% of those who are infected develop active disease during their lifetime. Current diagnostic tests neither differentiate between latent and active disease, nor do they predict future progression from latent to active tuberculosis. New tests with power to discriminate between latent and active tuberculosis could effectively improve control of tuberculosis in the future.

Through a joint project with the Danish biotech company Immudex ApS, supported by Innovation Fund Denmark, Andreas Fløe Hvass and the study group investigated if so-called CD8 cells can be detected directly in the blood from patients in different stages of tuberculosis infection. This project has demonstrated how immune recognition of tuberculosis are dependent on human tissue types, and has added to our knowledge about which particular fragments of tuberculosis bacilli are recognized by this part of the immune system. This information can be utilized in future diagnostic tests, as well as in the design of tuberculosis vaccines in the future.

The defence is public and takes place on 21<sup>st</sup> of February 2018 at Patologisk Auditorium, Aarhus University Hospital, Nørrebrogade 44, 8000 Aarhus C. The title of the project is "Exploring diagnostic opportunities in active and latent TB: Stratifying transmission risk using PCR, and identification of immunogenic CD8+ T-cell epitopes". For more information, please contact PhD student Andreas Fløe Hvass, email: andrni@rm.dk, Phone +45 26360885

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Assessment committee:

Trine Mogensen, Professor, MD, DMSc, PhD, Department of Infectious Diseases, Aarhus University Hospital

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Jose Dominguez, Associate Professor, PhD, Department of Microbiology, Universitat Autònoma de Barcelona, name, title and place of employment of the three members of the committee

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