

Focused Research Unit for Molecular Diagnostic and Clinical Research (MOK) 2019 annual report and Strategy 2020-2024



MOK-Ming Chen's group
IRS-Center Southern Jutland
University Hospital of Southern Jutland

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Welcome

This report presents the projects and research activities that have performed in the Focused Research Unit for Molecular Diagnostic and Clinical Research (MOK) – Ming Chen's group in 2019 and the research plan for 2020-2024.

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MOK-Ming Chen's group

Focused research unit for Molecular Diagnostic and Clinical Research (MOK) is a dynamic research unit at IRS-Center Sonderjylland, Institute of the Regional Health Research, University of Southern Denmark (SDU) and Hospital of Southern Jutland (SHS).

MOK is organized with a steering committee, a research leader, and two research groups in two departments in SHS, Department of Clinical Biochemistry and Department of Clinical Microbiology. Professor Vibeke Andersen is the leader of the group focusing on chronic inflammatory diseases. Senior Consultant, associate professor Ming Chen is the leader of the research group focusing on clinical microbiology.

This report is the 2019 annual report and research strategy 2020-2024 of MOK-Ming Chen's group. This group is also a part of the Department of Clinical Microbiology, SHS.

Vision

MOK has been established since 2015 with the aim to create a clinical research environment for molecular diagnostic and clinical research, thereby creating evidence-based knowledge that answers clinical questions and contributes to good patient care. Another purpose is to create a molecular research basis for other research groups in the hospital for new prevention and treatment strategies.

Our vision has always followed SHS's vision, which currently is "Your Satisfaction - Our Pride". The three strategical effort areas are 1) Consistent and secure patient care; 2) Professionalism and education; 3) Future Hospital of Southern Jutland. Our research plan has also always followed SHS's research plan, which follows Region Southern Denmark (RSD)'s strategy for health research: 1) Research for patient, 2) Research for clinic and 3) Research for development.

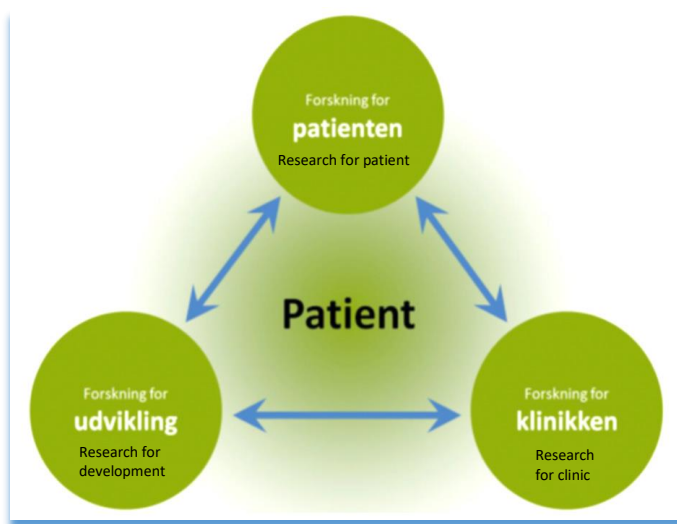


Figure 1. Region Southern Denmark (RSD)'s strategy for health research: 1) Research for patient, 2) Research for clinic and 3) Research for development.

MOK-Ming Chen's group has been intensively working on clinical molecular microbiological diagnostic, including development / optimization and implantation of new, fast and high quality molecular diagnostic methods for infectious disease, fx. MRSA, *C. difficile*, influenza virus, viral diarrhea and gastro bacterial and parasitic infections. We have collaborated with other research units internally in SHS and externally in RSD and throughout the country and international, fx. the project, "A national study of antibiotic resistance in 8 Danish Emergency Departments in 4 regions. Prevalence, risk factors and risk groups". We will continue our researches in collaboration with

clinical departments to give better services to patients, fx. fast and high quality of clinical microbiological diagnose to help rational use of antibiotics.

Members of MOK-Ming Chen's group

1. Bo Brødker Jensen, Medical doctor, PhD student
Project: Evaluation of *Rickettsia helvetica* as a pathogen in humans and significance of co-infection with tick-borne pathogens (in collaboration with Université de la Méditerranée, Faculté de Médecine, Marseille, France, OUH and University of Copenhagen (UC)).
2. Niels Møller Andersen, molecular biologist, PhD student
Project: Intestinal Disease Burden in Young Children in Southern Jutland, Denmark
3. Samir Badran, research assistant
Project: "Rapid Detection of Pathogens in Culture-Negative Sepsis-Patients Using Multiplex Droplet Digital PCR"
4. Ming Chen, MD, PhD. Senior Consultant Microbiologist, Associate Professor
Dept. of Clinical Microbiology, MOK, IRS-Center Southern Jutland, SDU, University Hospital of Southern Jutland,.
Main PhD supervisor for Bo and Niels. Co-supervisor for three PhD students in 2019.
5. The leader of Clinical Microbiology, Steen Lomborg Andersen.

PhD projects:

1. Evaluation of *Rickettsia helvetica* as a pathogen in humans and significance of co-infection with tick-borne pathogens (in collaboration with OUH, UC and SSI).
2. Intestinal Disease Burden in Young Children in Southern Jutland, Denmark

Other research projects:

1. Application of Modern Molecular Techniques to the Study of Hospital Acquired Infections-Focus on *Methicillin-resistant Staphylococcus aureus* and *Clostridium difficile* Infections.
2. *Mycoplasma genitalium* prevalence and macrolide resistance-associated mutations and coinfection with *Chlamydia trachomatis* in southern Jutland, Denmark.
3. Rapid Detection of Pathogens in Culture-Negative Sepsis-Patients Using Multiplex Droplet Digital PCR.

Collaboration:

1. International collaboration:

- 1) Professor Peter Gerner-Smidt, Chief of the Enteric Diseases Laboratory Branch and PulseNet, Centers for Disease Control and Prevention (CDC), USA. Etiology of diarrhea and risk factors for diarrhea among children in Southern Jutland (Niels's PhD project).
- 2) Prof. Pierre-Eduoard Fournier, at the reference laboratory at Unité des Rickettsies, Université de la Méditerranée, Faculté de Médecine, Marseille, France. Evaluation of *Rickettsia helvetica* as a pathogen in humans and significance of co-infection with tick-borne pathogens (Bo's PhD project).
- 3) Professor Jian Miao, Beijing University of Chinese Medicine, Beijing, China: Investigating anti-resistant bacteria activity of Traditional Chinese Medicinal (TCM) plants.
- 4) Professor Wang Yuguang, Beijing Hospital of Traditional Chinese Medicine, Beijing, China: Study on treating respiratory infections with TCM or in combination TCM and modern medicine.
- 5) China-Denmark *H. pylori* study group: Professor Jian Zhon Zhang, China CDC, Beijing, China; Leif P Andersen, University Hospital of Copenhagen (UHC), and Karen Kroghfelt, Statens Serum Institute (SSI).

2. National collaboration:

- 1) Lief P Andersen (UHC), Alice Friis-Møller and Kristian Schønning (University Hospital of Hvidovre). To investigate activity of novel treatment agents against *C. difficile* associated diarrhea in a mouse model.
 - 2) A collaborative research project between Region Zealand, Region Middle Jutland, Region Northern Jutland and Region Southern Denmark: Cross sectional study of multiresistant bacteria in Danish emergency departments: prevalence, patterns and risk factors for colonization (AB-RED project).
 - 3) Jacob Bodilsen, Department of Infectious Diseases, Aalborg University Hospital and others: Community-acquired meningitis caused by beta-haemolytic streptococci in adults: a nation-wide population-based cohort study.
 - 4) In collaboration with OUH, SSI and other departments at SHS: Clinical presentation of an outbreak of foodborne botulism in Southern Denmark
 - 5) In collaboration with OUH and UC: Evaluation of *Rickettsia helvetica* as a pathogen in humans and significance of co-infection with tick-borne pathogens
3. Regional collaboration:
- 1) Christian Backer Mogensen, Annmarie Lassen, Isik Johansen (OUH) and others: The impact of antibiotic stewardship on the use of antibiotics in hospital (SODAS).
 - 2) Michael Kemp, OUH and all Clinical Microbiology Departments in the region: Bacterial Genome Center of Southern Denmark - A collaborative project to combat hospital-acquired infections in the Region of Southern Denmark.
 - 3) Jette Primdahl, Danish Hospital for Rheumatic Diseases and Pia Lysdal Veje, University College South Denmark, UCSYD: Traditional bedside versus disposable bath focusing on patients' perspective, reducing microbiological reservoir and cost effectiveness
 - 4) In collaboration with OUH and Hospital Lillebaelt: Diagnosis of infections in the emergency department (INDEED study Infectious Diagnostics in Emergency Departments molecular diagnostics of pneumonia and pyelonephritis)
4. SHS collaboration:

- 1) Mats Lindberg and Christian Backer Mogensen, FAM: Effect goals of evaluation of implementation of COBAS Liat for respiratory tract testing
- 2) Lotte Høeg Hansen and others, Department of Paediatrics: Can prescription of antibiotics to children with respiratory tract infections be reduced by improved diagnostics
- 3) Elsebeth Stenager and Monica Pankiewicz-Dulacz, Focused Research Unit of Psychiatry, Department of Psychiatry: Prevalence and risk of infections in schizophrenia patients. A nationwide register-based study.
- 4) Egon Stenager and Nasir Musa Al-Mashkur, Focused Research Group of Neurology, Department of Neurology: Prevalence of Rickettsia infection in patients with facial paralysis

Tasks in 2020-2024:

- To conduct research within the molecular diagnostic and clinical research area in Southern Jutland.
- To collaborate with other research units in and outside SHS/RSD in order to establish and implement new research projects, including internationally through the establishment of joint projects.
- To collaborate other research groups in SHS to initiate researches, PhD and post.doc related to clinical microbiology.

To have one PhD student in 2020. To have one or two PhD students and more than two publication and more than one international congress with posters/oral presentations per year in 2020-2024.

- To obtain internal and external funding for the research.
- To better understanding conjunction with epidemics and outbreaks of two hospital infections, MRSA and *C. difficile* transmissions with molecular techniques in SHS.

Publication in 2019

1. Skyum F, Pedersen C, Andersen V, Chen M, Franke A, Petersen D, Riss W, Mogensen CB. "Risk factors for contagious gastroenteritis in adult patients with diarrhoea in the emergency department - a prospective observational multicentre study." BMC Infect Dis. 2019 Feb 11;19(1):133. doi: 10.1186/s12879-019-3754-4.

2. Veje PL, Chen M, Jensen CS, Sørensen J, Primdahl J “Bed Bath with Soap and Water or Disposable Wet Wipes: Patients’ Experiences and Preferences”. *J. Clinical Nursing*. 2019 Jun;28(11-12):2235-2244.
3. Ma Y, Chen M, Guo Y, Liu J, Chen W, Guan M, Wang Y, Zhao X, Wang Y, Li H, Meng L, Wen Y, Wang Y. “Prevention and Treatment of Infectious Diseases by Traditional Chinese Medicine: A Commentary”. *APMIS*. 2019 May;127(5):372-384.
4. Skjøt-Arkil, H., Mogensen, C. B., Lassen, A. T., Johansen, I. S., Chen, M., Petersen, P., Andersen, K. V., Ellermann-Eriksen, S., Møller, J. M., Ludwig, M., Fuglsang-Damgaard, D., Nielsen, F.E., Petersen, D. B., Jensen, U.S. & Rosenvinge, F. S., “Carrier prevalence and risk factors for colonisation of multiresistant bacteria in Danish emergency departments: a cross-sectional survey”. *BMJ Open*. 2019 Jun 27;9(6):e029000. doi: 10.1136/bmjopen-2019-029000.
5. Østergaard L, Bruun NE, Voldstedlund M, Arpi M, Andersen CØ, Schønheyder HC, Lemming L, Rosenvinge F, Valeur N, Søggaard P, Andersen PS, Skov R, Chen M, Iversen K, Gill S, Lauridsen TK, Dahl A, Oestergaard LB, Povlsen JA, Moser C, Bundgaard H, Køber L, Fosbøl EL. “Prevalence of Infective Endocarditis in Patients with Positive Blood Cultures: A Danish nationwide study”. *Eur Heart J*. 2019 May 30. pii: ehz327. doi: 10.1093/eurheartj/ehz327. [Epub ahead of print]
6. Pankiewicz-Dulacz, M, Stenager, E, Chen, M, Stenager, E. “Risk factors of major infections in schizophrenia. A nationwide Danish register study”. *J. Psychosomatic Research*. 2019, June 121: 60-67.
7. Kjærgaard N, Bodilsen J, Justesen US, Schønheyder HC, Østergaard C, Ellermann-Eriksen S, Dzajic E, Chen M, Møller JK, Dessau RB, Frimodt-Møller N, Jarløv JO, Nielsen H. “Community-acquired meningitis caused by beta-haemolytic streptococci in adults: a nation-wide population-based cohort study”. *European Journal of Clinical Microbiology & Infectious Diseases*. 2019, 38(12):2305-2310.
8. Veje, P. L., Chen, M., Jensen, C. S., Sørensen, J. & Primdahl, J., Effectiveness of two bed bath methods in removing microorganisms from hospitalized patients: A prospective randomized crossover study: *American Journal of Infection Control*. 2019 Dec 6. pii: S0196-6553(19)30903-4.

Congress posters in 2019:

1. Meffert KS, Chen M, Knudtzen FC, Brogaard KA, Brandt F, Skovgaard S. "A Clinical presentation of an outbreak of foodborne botulism in Southern Denmark". Toxins 2019, Copenhagen, Denmark, Jan. 16-19, 2019.
2. Andersen NM, Sørensen G, Østerlund M, Persen S, Chen M. "Molecular characterisation of Clostridium difficile epidemiology in Southern Jutland, Denmark". 29th ECCMID, Amsterdam, The Netherlands, April 13-16, 2019.
3. Jensen BB, Andersen NS, Fournier PE, Jensen PM Paarup HM, Skarphedinsson S, Chen M. "Prevalence of rickettsiosis in a risk group in Denmark". 29th ECCMID, Amsterdam, The Netherlands, April 13-16, 2019.
4. Kjærgaard N, Bodilsen J, Justesen US, Schønheyder HC, Østergaard C, Ellermann-Eriksen S, Dzajic E, Chen M, Møller JK, Dessau RB, Frimodt-Møller N, Jarløv JO, Nielsen H. "Community-acquired meningitis caused by beta-haemolytic streptococci in adults: a nation-wide population-based cohort study". 29th ECCMID, Amsterdam, The Netherlands, April 13-16, 2019.

Activities in 2019

1. Toxins 2019, Copenhagen, Denmark, Jan. 16-19, 2019.
2. PhD thesis defence, SHS, May 9, 2019
3. Together with Departments of Clinical Microbiology at Vejle Hospital and Esbjerg Hospital to arrange Danish Society of Clinical Microbiology (DSKM) Annual Meeting, Nyborg, 15-16 Mar. 2019 and there three oral presentations from the group and chair one section.
4. 29th ECCMID, Amsterdam, The Netherlands, April 13-16, 2019
5. PhD thesis defence, Odense, Jun. 28, 2019
6. IMMEX XII, Dubrovnik, Croatia, Sept. 18-21, 2019

Grants received in 2019

We obtained 407.000 DKK from Region of Southern Denmark for project, "Rapid Detection of Pathogens in Culture-Negative Sepsis-Patients Using Multiplex Droplet Digital PCR".

Contact

For more information about our research or interesting in collaboration with us, please contact Ming Chen; Tel.: +45 7997 4768; ming.chen@rsyd.dk.

