1st DCPM Workshop at the
11th IFAC Symposium on Biological and Medical Systems

Pulmonary Dynamics track
organized by the DCPM partners (two sessions)

Monday September 20, 2021

MoAInv Regular Session, Meeting Room
Pulmonary Dynamics I

Chair: Desaive, Thomas	University of Liege
Co-Chair: Ionescu, Clara	Ghent University

07:40-08:00, Paper MoAInv.1

Predicting Pulmonary Distension in a Virtual Patient Model for Mechanical Ventilation

Sun, Qianhui (University of Canterbury), Chase, J. Geoffrey (University of Canterbury), Zhou, Cong (University of Canterbury), Tawhai, Merryn (University of Auckland), Knopp, Jennifer L. (University of Canterbury), Moeller, Knut (Furtwangen University), Shaw, Geoffrey M (Christchurch Hospital, Canterbury District Health Board)

08:00-08:20, Paper MoAInv.2

Impact of Two Lung Elastance Identification Methods on Pulmonary Mechanics Prediction

Sun, Qianhui (University of Canterbury), Chase, J. Geoffrey (University of Canterbury), Zhou, Cong (University of Canterbury), Tawhai, Merryn (University of Auckland), Knopp, Jennifer L. (University of Canterbury), Moeller, Knut (Furtwangen University), Shaw, Geoffrey M (Christchurch Hospital, Canterbury District Health Board)

08:20-08:40, Paper MoAInv.3

B-Spline Modelling of Inspiratory Drive in NAVA-Ventilated Patients

Knopp, Jennifer L. (University of Canterbury), Guy, Ella (University of Canterbury), Kim, Kyeong Tae (University of Canterbury), Shaw, Geoffrey M (Christchurch Hospital, Canterbury District Health Board), Chase, J. Geoffrey (University of Canterbury)

08:40-09:00, Paper MoAInv.4

Pilot Study of Model-Based Estimation of Inspiratory Driving Pressure in CPAP Ventilation

Guy, Ella (University of Canterbury), Knopp, Jennifer L. (University of Canterbury), Chase, J. Geoffrey (University of Canterbury)

09:00-09:20, Paper MoAInv.5

[Safe Mechanical Ventilation Treatment Settings for Respiratory Failure Patients](#)

Lee, Jay Wing Wai (Monash University Malaysia), Azlan Shah, Sulaiman Shah (Monash University Malaysia), Wang, Xin (Monash University Malaysia), Chiew, Yeong Shiong (Monash University), Mat Nor, Basri (Department of Intensive Care, International Islamic University M), Chase, J. Geoffrey (University of Canterbury)

09:20-09:40, Paper MoAInv.6

[Model-Based Patient Matching for In-Parallel Multiplexing Mechanical Ventilation Support](#)

Wong, Jin Wai (Monash University Malaysia), Chiew, Yeong Shiong (Monash University), Desaive, Thomas (University of Liege), Chase, J. Geoffrey (University of Canterbury)

09:40-10:00, Paper MoAInv.7

[Minimal Lung Mechanics Basis-Functions for a Mechanical Ventilation Virtual Patient](#)

Sun, Qianhui (University of Canterbury), Chase, J. Geoffrey (University of Canterbury), Zhou, Cong (University of Canterbury), Tawhai, Merryn (University of Auckland), Knopp, Jennifer L. (University of Canterbury), Moeller, Knut (Furtwangen University), Heines, Serge J.H (Department of Intensive Care, Maastricht University Medical Cent), Bergmans, Dennis C.J.J. (Department of Intensive Care, Maastricht University Medical Cent), Shaw, Geoffrey M (Christchurch Hospital, Canterbury District Health Board)

MoB03 Regular Session, Amphitheater
Pulmonary Dynamics II

Chair: Zhou, Cong   University of Canterbury
Co-Chair: Chiew, Yeong Shiong   Monash University

11:15-11:35, Paper MoB03.1

[Two-Port Network Modeling for Bio-Heat Transfers in Lungs](#)

Duhé, Jean-François (Université De Bordeaux, IMS, CNRS UMR 5218), Victor, Stephane (Université De Bordeaux, IMS), Melchior, Pierre (Université De Bordeaux - Bordeaux INP/ENSEIRB-MATMECA), Abdelmoumen, Youssef (IHU Liryc, Electrophysiology and Heart Modeling Institute, Fonda), Roubertie, François (IHU Liryc, Electrophysiology and Heart Modeling Institute, INSER)

11:35-11:55, Paper MoB03.2

[Flipped Halfwave: Improved Modeling of Spontaneous Breathing Effort](#)

Reinders, Joey (Eindhoven University of Technology & Demcon Advanced Mechatronic), van de Kamp, Lars (TU Eindhoven), Hunnekens, Bram (Eindhoven University of Technology), Oomen, Tom (Eindhoven University of Technology), van de Wouw, Nathan (Eindhoven Univ of Technology)

11:55-12:15, Paper MoB03.3

Estimating Patient-Specific Maximum Recruitable Volume in Neonatal Lungs

McDonald, Mariah Aroha (University of Canterbury), Knopp, Jennifer L. (University of Canterbury), Kim, Kyeong Tae (University of Canterbury), Dixon, Bronwyn (Neonatal Intensive Care Unit, Christchurch Women's Hospital), Chase, J. Geoffrey (University of Canterbury)

12:15-12:35, Paper MoB03.4

Identification of Asynchronous Effect Via Pressure-Volume Loop Reconstruction in Mechanically Ventilated Breathing Waveforms

Zhou, Cong (University of Canterbury), Chase, J. Geoffrey (University of Canterbury), Sun, Qianhui (University of Canterbury), Knopp, Jennifer L. (University of Canterbury), Tawhai, Merryn (University of Auckland), Desaive, Thomas (University of Liege), Moeller, Knut (Furtwangen University), Shaw, Geoffrey M (Christchurch Hospital, Canterbury District Health Board), Chiew, Yeong Shiong (Monash University), Benyo, Balazs (Budapest University of Technology and Economics)

12:35-12:55, Paper MoB03.5

Does Facemask Impact Diagnostic During Pulmonary Auscultation?

Uyttendaele, Vincent (University of Liège), Guiot, Julien (University Hospital of Liège), Chase, J. Geoffrey (University of Canterbury), Desaive, Thomas (University of Liege)

12:55-13:15, Paper MoB03.6

Real-Time Estimation of Lung Model Parameters and Breathing Effort During Assisted Ventilation

Schauer, Thomas (Technische Universitaet Berlin), Simanski, Olaf (HS Wismar-University of Applied Sciences: Technology, Business A)

Wednesday September 22, 2021

WeAT1 Regular Session, Amphitheater
Diabetes Dynamics I

Chair: Jorgensen, John Bagterp   Technical University of Denmark
Co-Chair: Pooke, Francis Craig   University of Canterbury

09:00-10:00, Paper WeAT1.1
A Robust H-Infinity Control Approach for Blood Glucose Regulation in Type-1 Diabetes

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Cassany, Louis (University of Bordeaux), Gucik-Derigny, David (University of Bordeaux, IMS Lab), Cieslak, Jérôme (University of Bordeaux), Henry, David (Université De Bordeaux), Franco, Roberto (Tecnológico Nacional De México/I.T. La Laguna), Ferreira, Alejandra (CONACyT at CITEDI-IPN), Ríos, Héctor (CONACYT-Tecnológico Nacional De México/I.T. La Laguna), Olçomendy, Loïc (Université De Bordeaux), Pirog, Antoine (Université De Bordeaux), Bornat, Yannick (Université De Bordeaux), Renaud, Sylvie (Université De Bordeaux), Catargi, Bogdan (CHU De Bordeaux)

09:00-10:00, Paper WeAT1.2
Prediction of Postprandial Glucose Excursions in Type 1 Diabetes Using Control-Oriented Process Models

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Adelberger, Daniel (Johannes Kepler University Linz), Reiterer, Florian (Nemak Linz GmbH), Schrangl, Patrick (Johannes Kepler University Linz), Ringemann, Christian (Roche Diabetes Care GmbH), Huschto, Tony (Roche Diabetes Care GmbH), del Re, Luigi (Johannes Kepler University)

09:00-10:00, Paper WeAT1.3
Estimating Insulin Sensitivity after Exercise Using an Unscented Kalman Filter

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Deichmann, Julia (ETH Zurich), Kaltenbach, Hans-Michael (ETH Zurich)

WeBT1 Regular Session, Amphitheater
Diabetes Dynamics II

Chair: Jorgensen, John Bagterp   Technical University of Denmark

Co-Chair: Pooke, Francis Craig   University of Canterbury

10:15-12:15, Paper WeBT1.1

Estimating Endogenous Glucose Production During Exercise Using Heartrate: Implications for Diabetes Management

Ormsbee, Jennifer J. (University of Canterbury), Zhou, Tony (University of Canterbury), Knopp, Jennifer L. (University of Canterbury), Chase, J. Geoffrey (University of Canterbury)

10:15-12:15, Paper WeBT1.2

Initial Titration for People with Type 1 Diabetes Using an Artificial Pancreas

Sejersen, Maria (Technical University of Denmark), Boiroux, Dimitri (Novo Nordisk A/S), Engell, Sarah Ellinor (Technical University of Denmark), Ritschel, Tobias K. S. (Technical University of Denmark), Reenberg, Asbjørn Thode (Technical University of Denmark), Jorgensen, John Bagterp (Technical University of Denmark)

10:15-12:15, Paper WeBT1.3

STAR-3D Clinical Trial Results: Improved Performance and Safety

Uyttendaele, Vincent (University of Liège), Knopp, Jennifer L. (University of Canterbury), Desaive, Thomas (University of Liege), Chase, J. Geoffrey (University of Canterbury)

10:15-12:15, Paper WeBT1.4

Glucose Response to Fast and Long-Acting Insulin in People with Type 2 Diabetes

Engell, Sarah Ellinor (Technical University of Denmark), Aradóttir, Tinna Björk (DTU), Bengtsson, Henrik (Novo Nordisk A/S), Ekelund, Magnus (Novo Nordisk A/S), Jorgensen, John Bagterp (Technical University of Denmark)

10:15-12:15, Paper WeBT1.5

The Separation of Insulin Pump Hardware and Software - a Novel and Low-Cost Approach to Insulin Pump Design

Payne, Matthew (University of Canterbury), Pooke, Francis Craig (University of Canterbury), Chase, J. Geoffrey (University of Canterbury), Campbell, Jake (University of Canterbury), Holder-Pearson, Lui (University of Canterbury), Knopp, Jennifer L. (University of Canterbury)

WeBT2 Regular Session, Meeting Room
Cardiovascular Dynamics

Chair: Soltesz, Kristian   Lund University
Co-Chair: Desaive, Thomas   University of Liege

10:15-12:15, Paper WeBT2.1
Identification of Cardiac Afterload Dynamics from Data (I)

Pigot, Henry (Lund University), Hansson, Jonas (Lund University), Audrius, Paskevicius (Lund University), Qiuming, Liao (Lund University), Sjöberg, Trygve (Lund University), Steen, Stig (Lund University), Soltesz, Kristian (Lund University)

10:15-12:15, Paper WeBT2.2
Observers for the Seidel–Herzel Model of Human Autonomic-Cardiorespiratory System

Othmane, Amine (Université Paris-Saclay, France; Saarland University, Saarbrücke), Mounier, Hugues (Laboratoire Des Signaux Et Systèmes, CNRS SUPELECUniversité Pari)

10:15-12:15, Paper WeBT2.3
Real-Time Feedback Control of LifeTec Group's Cardiac Biosimulator Based on Averaged Hemodynamics

de Vries, I.R. (Eindhoven University of Technology), Lazar, Mircea (Eindhoven Univ. of Technology), D'Alessi, Mattia (LifeTec Group), Stijnen, Marco (LifeTec Group)

10:15-12:15, Paper WeBT2.4
Real-Driving-Implementable Drowsy Driving Detection Method Using Heart Rate Variability Based on Long Short-Term Memory and Autoencoder (I)

Iwamoto, Hiroki (Kyoto University), Hori, Kentaro (Kyoto University), Fujiwara, Koichi (Kyoto University), Kano, Manabu (Kyoto University)

10:15-12:15, Paper WeBT2.5
Single Measurement Central Blood Pressure Estimate in Porcine Subjects with Induced Septic Shock

Murphy, Liam (University of Canterbury), Chase, J. Geoffrey (University of Canterbury), Davidson, Shaun M (University of Canterbury), Desaive, Thomas (University of Liege)

10:15-12:15, Paper WeBT2.6

Finite-Time Simultaneous Estimation of Aortic Blood Flow and Differentiation Order for Fractional-Order Arterial Windkessel Model Calibration

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Bahloul, Mohamed A. (King Abdullah University of Science and Technology), Benencase, Marcelo (King Abdullah University of Science and Technology), Belkhatir, Zehor (De Montfort University), Laleg, Taous-Meriem (King Abdullah University of Science and Technology (KAUST))

Additional DCPM contributions at the IFAC BMS 2021 symposium:

TuAT1 Invited Session, Amphitheater
AI Solutions in Medicine I

Chair: Cajo Diaz, Ricardo Alfredo   Ghent University
Co-Chair: Birs, Isabela Roxana   Technical University of Cluj-Napoca

09:00-11:00, Paper TuAT1.1
Model-Based Estimation of Frank-Starling Curves at the Patient Bedside

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Smith, Rachel Genevieve Rose (University of Canterbury), Chase, J. Geoffrey (University of Canterbury), Pretty, Christopher (University of Canterbury), Davidson, Shaun M (University of Canterbury), Shaw, Geoffrey M (Christchurch Hospital, Canterbury District Health Board), Desaive, Thomas (University of Liege)

09:00-11:00, Paper TuAT1.5
Digital Twins in Critical Care: What, When, How, Where, Why?

Chase, J. Geoffrey (University of Canterbury), Zhou, Cong (University of Canterbury), Knopp, Jennifer L. (University of Canterbury), Shaw, Geoffrey M (Christchurch Hospital, Canterbury District Health Board), Näswall, Katharina (University of Canterbury), Wong, Jennifer HK (University of Canterbury), Malinen, Sanna (University of Canterbury), Moeller, Knut (Furtwangen University), Benyo, Balazs (Budapest University of Technology and Economics), Chiew, Yeong Shiong (Monash University), Desaive, Thomas (University of Liege)

TuBT1 Invited Session, Amphitheater
AI Solutions in Medicine II

Chair: Copot, Cosmin   University of Antwerp
Co-Chair: Dulf, Eva Henrietta   Technical University of Cluj Napoca

11:15-13:15, Paper TuBT1.6

Behavior Analysis of Gender Based Cohorts Using the Toolset of Artificial Intelligence Based Insulin Sensitivity Prediction Methods

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Szabó, Bálint (Budapest University of Technology and Economics), Szlávecz, Ákos (Budapest University of Technology and Economics), Paláncz, Béla (Budapest University of Technology and Economics), Somogyi, Péter (Budapest University of Technology and Economics), Chase, J. Geoffrey (University of Canterbury), Benyo, Balazs (Budapest University of Technology and Economics)