

This year has seen many changes. As we prepare to start the New Year, we thank our colleagues here and abroad for the opportunity of continued cooperation.

After four years of hard but exciting work, the book project invited by the Royal Society of Chemistry has come to an end. All chapters of “Chronobiology and Chronomedicine: From Molecular and Cellular Mechanisms to Whole Body Interdigitating Networks”, co-edited by Tsuyoshi Hirota, Associate Professor, Nagoya University, Japan, have been completed, edited, and proof-read. We anticipate the publication of the 668-page book in February 2024. It covers all physiological systems and their role in several biological processes and disease conditions, with contributions from experts around the world. The help and moral support of Larry A Beaty (software engineer) throughout these four years is greatly appreciated.

This year saw the end of active cooperation with JAXA, the Japanese Space Agency, as new studies can no longer be submitted due to the enforced age-related mandatory retirement of the principal investigator, Kuniaki Otsuka, Professor emeritus at Women’s Medical University (Tokyo, Japan). Our last results reporting on changes in brain plasticity after a repeated long-term duration spaceflight were published in Scientific Reports. This year also saw the successful completion of the MESA (Multi-Ethnic Study of Atherosclerosis) project Larry and I were involved with. We are still in the process of preparing the documentation of the algorithms we developed and the R code we wrote, and may help with the analysis of additional data, in cooperation with David Jacobs, Professor of Epidemiology, and Daniel Duprez, Professor of Cardiology, both at the University of Minnesota. Results on subclavian calcification and its association with future cardiovascular events were presented at the November meeting of the American Heart Association in Philadelphia.

New investigations started. With Kuniaki, we explored the role played by the 12-hour component in the morning surge in blood pressure and overall wellbeing. It is thought to have a molecular mechanism even more ancient than that underlying the circadian system. A phase coupling between the 24-hour and the 12-hour components of blood pressure outside an acceptable window is associated with a blood pressure surge in the morning or evening and a decrease in overall wellbeing. With Denis Gubin, Professor at Tyumen State Medical University, Russia, we are investigating the role of light, notably blue light, on metabolism in residents of far-north towns in Siberia. With Denis, we also edited a special issue of the journal Applied Sciences entitled “Research on Circadian Rhythms in Health and Disease”. It was an opportunity to follow-up on studies in glaucoma with Denis, which showed that daytime lipid metabolism is related to retinal ganglion cells damage, and to revisit with Kuniaki ways by which human physiology responds to changes in geomagnetic activity on earth and in space.

Our project on the BIOSphere and the COSmos (BIOCOS) continues, notably in Brno, Czech Republic, with support from the A&D Company (Tokyo, Japan). With Jarmila Siegelova, Professor, and Alena Havelkova, Associate Professor, at Brno’s Masaryk University, we published results from several studies, which all support the need for around-the-clock monitoring for spans longer than 24 hours and for a chronobiologic interpretation of the data in preference to reliance on the day-night ratio. In this year’s Noninvasive Methods in Cardiology, we also illustrate how current clinical trials of blood pressure chronotherapy testing the relative merits of morning versus evening dosing should instead pursue a personalized approach to treatment timing that accounts for the chronodiagnosis.

The HCC also underwent major changes this year, after the passing on June 16 of our long-time associate, Mary Sampson at the age of 65. Linda Sackett-Lundeen now continues the work on the bibliography of Franz Halberg without Mary's help. She is preparing an updated version of the bibliography to include links to each entry whenever one is available. Cathy Lee Gierke, now retired, remains part of our team, as she graciously offered to help as we are getting ready to revamp the HCC website. New life has been injected into the HCC with the hire of A. Chase Turner, a software engineer who will work on a suite of cosinor-based procedures to be coded and published in Mathematica, work that he had already started as a volunteer. New investigations with him are currently being planned and formulated.

As in prior years, several students came to work on research projects at the HCC, while other students came to us to write their capstone. The HCC was represented at several international meetings. In Kosice, Slovakia, Germaine and Jarmila talked about blood pressure variability in pregnancy and during exercise training, respectively, at the 12th ICCD International Congress of Cardiology and Diabetes. They were also both invited to participate at the XI International Congress of Cardiology (ICC) & Cardiovascular Imaging in Dubai, UAE, where they lectured on sex differences in relation to diet and anti-hypertensive medication, and on blood pressure variability in women with ischemic heart disease in cardiac rehabilitation, respectively. At the annual meeting organized by Jarmila in Brno, Chase showcased his work in Mathematica, with illustrations of analyses he performed on data collected above the Arctic Circle as part of Denis' investigation. Features of the code he developed include a new version of the population-mean cosinor polar plot that can display graphical results inside the table containing the numerical results for each component in least squares population-mean spectra. As a faculty member of the Prato-Florence School of Integrative Medicine@Biophysics organized by Vincenzo Valenzi, Professor of Biophysics, La Sapienza University, Rome, Italy, on the occasion of its introductory seminar, Germaine lectured on circadian rhythm disorders, etiopathogenesis, physiopathology and possible remedies.

The HCC continues to benefit from cooperation by many more colleagues locally, nationally, and internationally. In particular, we are grateful to Drs. Francine and Julia Halberg who serve as advisors to the HCC. Their continued support of activities at the HCC is very much appreciated.

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