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D-10117 Berlin, Germany

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COVER

View of the two medieval lining towers in center town Bologna, at the sunrise. The tallest is called Asinelli, the smallest and more leaning tower is called Garisenda, from the names of the families that wanted their construction at the beginning of the XII century (1109-1119). Mentioned by Dante in the *Divine Comedy*, by Goethe in the *Italian Journey*, and by other poets and writers in the following centuries, the Two Towers are the landmark of Bologna and located in center town, at the intersection of the most ancient streets (including via Zamboni, the main artery of the University district). The Alma Mater Studiorum University of Bologna had been founded some years before, in 1088.

The photo has been taken by Prof. Jaroslav Pokorný, President of the Czech Physiological Society from a terrace at the beginning of via Zamboni during his stay in Bologna for the Meeting of the International Scientific Committee in preparation of the FEPS-SIF 2019 Congress.

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Dep. of Physiology and Pathophysiology, Faculty of Medicine, University of Ostrava, Czech Republic

Aim was to evaluate the influence of long exposure of dark on heart rate variability (HRV) in young people. This method is currently used in psychology with an improvement of mental health in people under constant stress. So far, no evidence of changes in autonomic nervous system function were measured after a long term stay in the dark. 29 students (19 to 26 years) were placed into a room with max. darkness for 96 h. The room met all the requirements for stay, (quiet, socially isolated place). The participants received food and drinks without using of any device emitting light or showing the actual time. Orthostatic test was used for measuring power LF, HF and LF/HF ratio. The first measurement was performed the day before starting the therapy, next measurement was taken 30 minutes after completing the session, followed by two more measurements in the fourth and the seventh day after exiting the chamber. The power HF showed a significant change between the first and the second measurement (increasing activity of HF) in the horizontal position ($p < 0,05$), with a similar trend observed during consecutive measurements. The LF/HF ratio pointed non-significantly to a modulatory influence of sympathetic and parasympathetic nervous system during the test. 96 h. of therapy and subsequent time disorientation likely influenced the parasympathetic nervous system regulation after completing the therapy. This discovery was further supported by a lowered heart rate which can also affect cardiovascular system.

PP.47

Loopomics: explaining the complexity of life by conjugating physiology and control theory

Burlando B^{1,2}, Martinoia S^{3,2}, Massobrio P³, Palmero S¹, Blanchini F⁴, Giordano G⁵

¹Dept. of Pharmacy, University of Genova, Italy; ²Biophysics Institute, National Research Council, Genova, Italy; ³Dept. of Informatics, Bioengineering, Robotics and Systems Engineering, University of

Genova, Italy; ⁴Dept. of Mathematics, Computer Science and Physics, University of Udine, Italy; ⁵Delft Center for Systems and Control, Delft University of Technology, Netherlands

The human body consists of about $3.7 \cdot 10^{13}$ cells, while a rough average of 109 chemical reactions per second occur inside each cell, yielding a total of about 1022 per second. The huge complexity of this system, and the lack of a synthetic theory, inevitably affect the

possibility of explaining events and processes, thus setting limits e.g. to the understanding and management of recalcitrant diseases like allergies, autoimmune and metabolic syndromes, cardiovascular disorders, neurodegenerative processes, and cancer. Life sciences principally model the body's functioning by using open chains (i.e. open loops), but the body is a self-sustained system maintaining steady state, meaning that its processes must be conversely regulated by closed loops. Loop dynamics can lead to stable equilibrium points, such as the regulation of body temperature and blood pressure, or give rise to sustained oscillations, like hormone fluctuations, pacemaker activities, and neural oscillatory activity. We considered endocrine and neural networks from literature data and experimental recordings, and then modeled them in terms of functional agents (loop nodes) and their interactions (loop arcs), allowing us to investigate loop dynamics at different scales. We performed a structural analysis of the resulting dynamic loop network, described in terms of an ordinary-differential-equation model, and of the associated interaction matrix. Our analysis revealed the presence of candidate oscillators, each admitting a single equilibrium point that can either be stable or give rise to oscillatory instability. Such a result could represent a recurrent motif of loop arrangements, both within and among cells and organs, possibly leading to a general paradigm with direct repercussions on medicine and health care.

PP.48

DSS-induced colitis generates chronic visceral hypersensitivity in rats

López-Estévez S, Martínez V

Department of Cell Biology, Physiology and Immunology; Neuroscience Institute, Universitat Autònoma de Barcelona, Spain

Visceral hypersensitivity is a key component of functional gastrointestinal disorders in humans. This characteristic has been difficult to mimic in animal models. We assessed the validity of dextran sulfate sodium (DSS)-induced colitis in the development of long-term colonic hypersensitivity in rats and the potential mechanisms involved. Adult, female SD rats were used ($n=23$). Colitis was induced by exposure to a 5% solution of DSS during a 7-day period (day 0-7). Colonic sensitivity was assessed by determining pain-related visceromotor responses to isobaric colorectal distension (CRD; 12 pulses at 80 mmHg/30 s duration, 5 min interval between pulses). Colonic sensitivity was assessed before (day 0) and after colitis induction (days 17-35; every 3-4 days). Changes in the expression of immune and nociceptive markers (RT-