Calorimetric measurements on small tissue samples

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If heat from anoxic processes significantly contributes to the overall heat production of living matter, calorimetry becomes a valuable tool in addition to respirometry. This is particularly relevant in the study of specific metabolic processes that run completely anaerobically, such as the enzyme-catalyzed hydrolysis of ATP in muscle cells, one of the processes that is important for the thermogenesis in mammals.

When studying the energy metabolism of mammals, the potentially time-dependent physiological state of the organism has to be taken into account. Sampling at different times and without significantly affecting the subject is therefore often necessary. Therefore, only little material, usually obtained by biopsy, is available for measurements in this case. This is the situation where chip calorimetry proves beneficial.

In order to be able to measure the heat production in small tissue samples but also in single multicellular organisms, the Freiberg flow-through chip calorimeter [1] was equipped with a special sample transport technique that allows reliable positioning of tissue samples in the measuring chamber of the calorimeter. Using this technique, samples of amounts in the range of 2 - 5 mg can be measured within 6 min after insertion into the measuring channel.

Selected results from our studies on muscle tissue of Tegus lizards, brown adipose tissue (BAT) and on larvae of *Drosophilia* flies will be presented.

Keywords: Chip calorimetry, Tegus lizards, *Drosophilia*, brown adipose tissue

[1] Thermopile chip based calorimeter for the study of aggregated biological samples in segmented flow. Hartmann, T.; Barros, N.; Wolf, A.; Siewert, C.; Volpe, P. L. O.; Schemberg, J.; Grodrian, A.; Kessler, E.; Hanschke, F.; Mertens, F.; Lerchner, J.; Sensors and Actuators, B: Chemical (2014), 201, 460-468.