

Isothermal microcalorimetry in medicine and life science

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Isothermal microcalorimetry is used in many different fields. It is used more and more in life sciences but is not used in routine in medicine yet. Still several studies have shown that the sensitivity of isothermal microcalorimetry could offer a non negligible advantage in the detection of cell metabolic activity. Among the cells of interest, the detection of pathogenic microbes has been investigated because early detection of infections allows a better treatment of patients. Similarly the metabolic heat production of tumorous cells and biopsies was investigated and was shown to allow rapid diagnosis and grading of different cancer types.

Although isothermal microcalorimetry was shown to provide great results in detecting infections or cancer, its use to perform drug susceptibility testing and select the appropriate treatment is even more promising. In this context we have shown that for urospetic patients an antibiogram could be obtained in 7 hours. This accuracy of the antibiogram provided by isothermal microcalorimetry was similar to the accuracy of the antibiogram provided by commonly used automated system after 24 to 48 hours. Well-plate format microcalorimeters and flow through calorimeters on a chip might allow to reduce this time even more. Also work with cancer microtissues that are a very useful model for anti-tumorous drug susceptibility testing with such instruments is very promising.

Currently the major issues hindering the use of isothermal microcalorimetry in the clinic is the lack of appropriate and user friendly analytical routines and software. In addition, very few training is offered in biological calorimetry thus hindering even more its use.