Metabolic and Pharmacokinetic studies in peripheral tissues carried out by Microdialysis in chronically implanted conscious animals

Why a new design of the Microdialysis Probe?

Microdialysis has become widely accepted as an in vivo technique for continuous monitoring of neurotransmitter release in both anaesthetized and conscious animals. However, applications of Microdialysis outside the CNS to study tissue metabolism, drug distribution and kinetics, have been less frequent until recently.

A number of papers where Microdialysis has been applied in different organs and body fluids was published . Most of these studies were done on anaestethized animals, mostly because a Microdialysis Probe specially designed for body organs was not available. The **CMA/11** and **CMA/12 Microdialysis Probes** made for brain implantation are constructed of stainless-steel cannulae and hard plastic. They cannot be used on conscious animals without causing pain, stress and additional tissue damage. Furthermore, a probe for peripheral tissues must have a special system for implantation, attachment to the tissue and connection to a perfusion pump.

These facts led to the construction of a new type of the Microdialysis Probe which is soft, flexible and easy to implant in virtually any organ in the body.
The **CMA/20 Microdialysis Probe** with a specially designed Introducer fulfils all the criteria for painless chronic use. The CMA/20 Microdialysis Probe together with the **CMA/120 System for Freely-Moving Animals**, provides a unique tool for continuous in vivo monitoring of molecules in a conscious animal for at least 24 hours.

How is the CMA/20 Microdialysis Probe implanted?

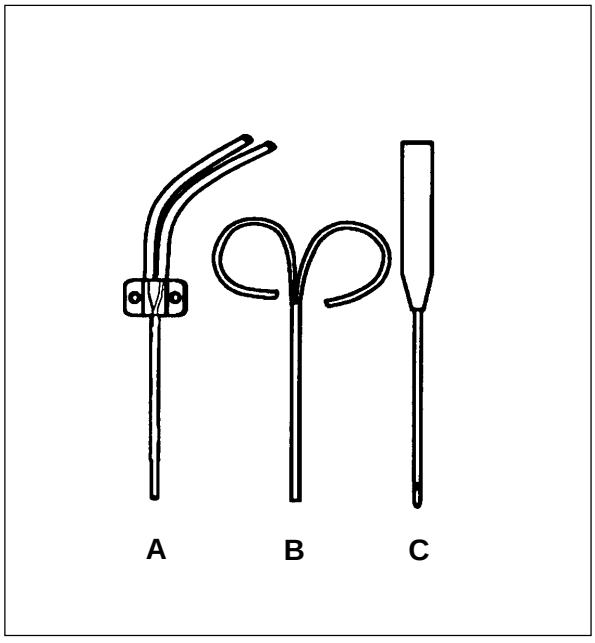

*Fig. 1. The implantation procedure for the **CMA/20 Microdialysis Probe** (**A**) follows a similar procedure as used in clinical practice for intravenous catheterization. Briefly, a probe (**A**) is implanted into the tissue of an anaesthetized animal with help of an Introducer (**B**+**C**). The needle (**C**) is then removed and the CMA/20 Microdialysis Probe is inserted into the tubing (**B**). The plastic wing of the probe is sutured to the tissue. The tubing is removed by pulling and tearing it apart. The animal is placed in the **CMA/120 System for Freely-Moving Animals** and allowed to recover.*

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What are the benefits of using Microdialysis in peripheral tissues ?

The most fascinating feature of Microdialysis in conscious animals is that one can monitor chemical changes in the body directly during a drug or food intake, stress, exercise, etc.

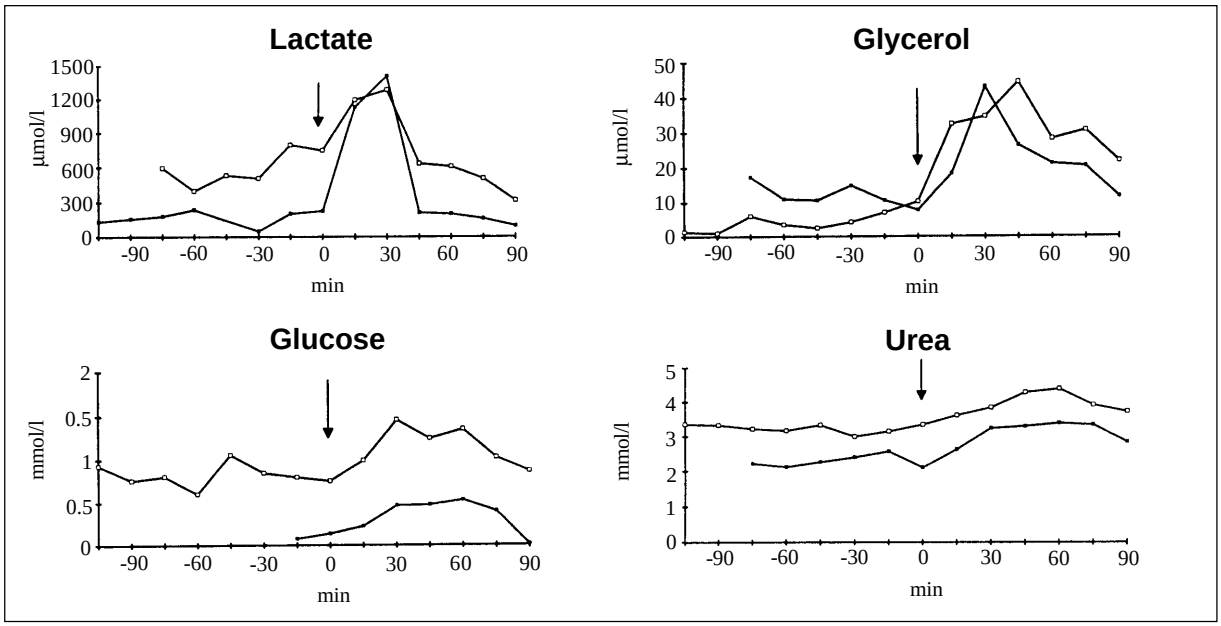

Fig. 2. The figure illustrates the very first application of the CMA/20 Microdialysis Probe to study the effects of acute stress (5 min tail pinch) on lactate , glycerol, glucose and urea levels in the fat of a rat. As seen, the 5 min stress (indicated by arrow) induced a dramatic increase in lactate, glycerol, and to certain extent glucose, within the first 30 minutes. Lactate returned quickly to basal levels, while glycerol and glucose remained increased for about another 60 minutes. Urea concentration is supposed not to be affected by activated metabolism or blood flow and indeed, only a very slight increase in urea levels was measured. This fact may also serve as an evidence that recovery from the probe was not affected by the period of hyperactive movement of the rat during the stress. Thus it can be concluded that the observed changes of lactate, glycerol and glucose reflect the physiological response of the animal to stress, rather than experimental artifacts related to tissue movement.

What are the requirements for a successful experiment?

The implantation of the Microdialysis Probe into tissues other than brain has some specific requirements. The most successful and reproducible experimental data are achieved using the **CMA/20 Microdialysis Probes** with 4 or 10 mm membranes and following recommended surgical procedures. The **CMA/120 System for Freely-Moving Animals** should be used for connecting the animal to the **CMA/100 Microinjection Pump** and to the **CMA/170**, **CMA/140** or the **CMA/142 Fraction Collectors**.

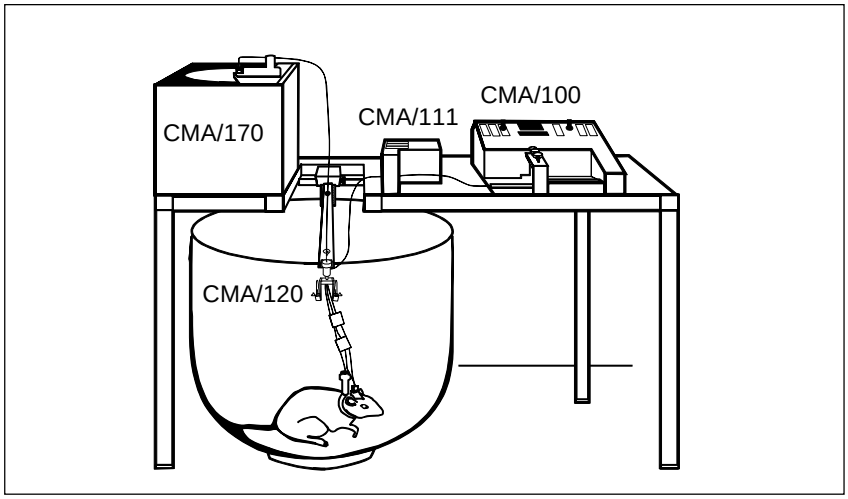

Fig. 3. The CMA/120 System for Freely-Moving Animals, CMA/100 Microinjection Pump, CMA/111 Syringe Selector and the CMA/170 Refrigerated Fraction Collector.

What has been published about Microdialysis in peripheral organs ?

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Note: The CMA Microdialysis Probes are not intended for use in humans. It is only suitable for laboratory research on animals.

If you require further details on Microdialysis procedures, HPLC analysis, instrumentation or bibliography, please do not hesitate to contact:

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