



Prior to analyses of

- Acetylcholine
- Cyclic AMP
- Cyclic GMP
- GABA
- DOPA
- 5-HTP
- Serotonin
- Endorphin
- Catecholamines and their metabolites
- Prostaglandin

INTRODUCTION

In neurochemical studies of the brain, it is of great importance to accurately measure neurochemical events in vivo. However, it is difficult to perform reproducible and meaningful measurement of these events because rapid post-mortem changes occur in the brain concentrations of several metabolites and some neurotransmitters.

Therefore, various techniques have been developed to prevent post-mortem changes. One of the more common method is cooling or freezing by immersion of the living animal and the decapitated head in liquid Nitrogen or cooled Freon to inactivate enzymes involved in the metabolism of these compounds. Although cooling is frequently used in many laboratories, it is not fully effective in preventing post-mortem changes. The time required to freeze deep structure of the brain may range from 10 - 90 seconds due to the poor thermal conductivity of tissues surrounding the brain; post-mortem changes will occur during this period.

An alternate method is microwave heating to inactivate enzymes. The method has several advantages over cooling or freezing :

If microwave power of sufficient level is focused on the animal's head, the enzymes in the whole brain can be completely inactivated in a very short time. Further, the brain can be dissected easily and reproducibly at room temperature.

Therefore, microwave irradiation system is quite useful when measuring Acetylcholine, Choline, Cyclic AMP, Cyclic GMP, GABA, DOPA, 5-HTP, Serotonin, Endorphin, Prostaglandin, Catecholamines and their metabolites in the brain and so forth.

Microwave fixation system must be such as to satisfy the following criteria:

- Can elevate the temperature of brain up to 75-90°C as rapidly as possible.
- Can effectively focus microwave energy only on the head of an animal.
- Will give the same results from animal to animal.
- The apparatus should be easily and safely used since personnel not experienced in microwave technology will use it.
- Muromachi Microwave Fixation Systems are safely designed so that the microwave leakage will not exceed 5 mW/cm².

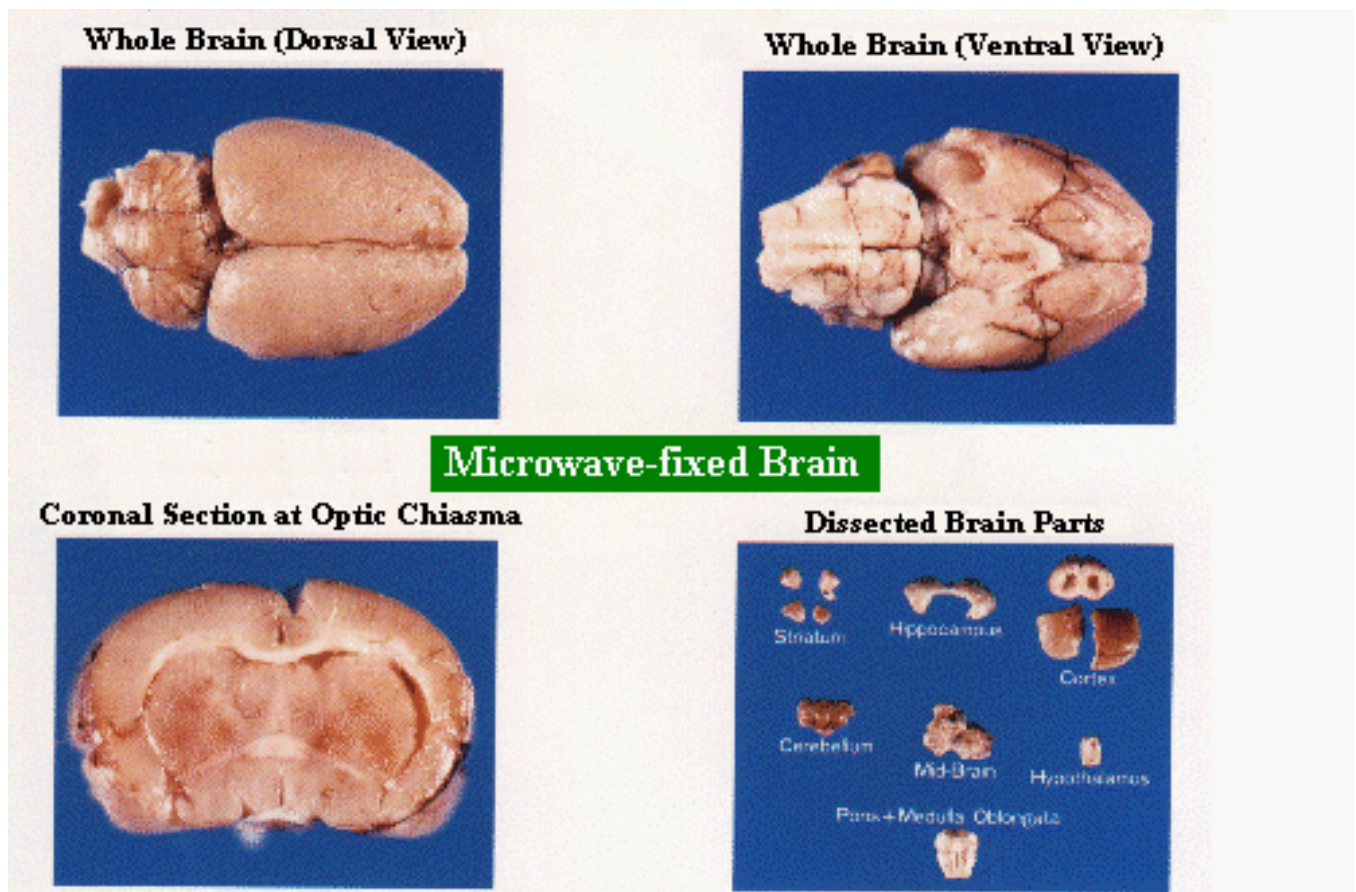


Fig.1 Effect of microwave irradiation on ChAc and ChE activities in rat brain.

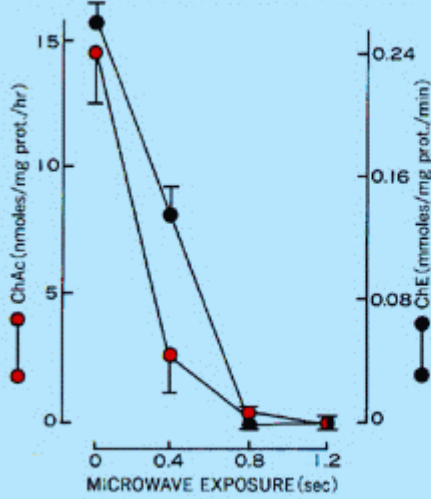


Fig.2 Effect of microwave irradiation on T-OH and MAO activities in rat brain.

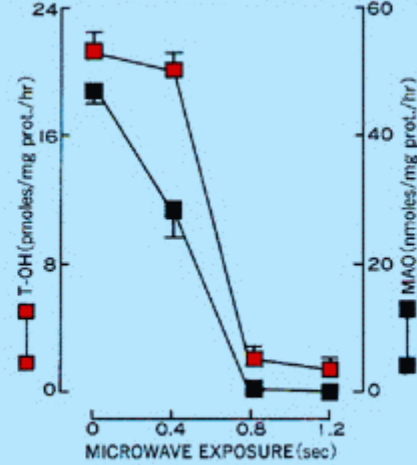


Fig.3 Effect of microwave irradiation on GAD and GABA-T-SSADH activities in rat brain.

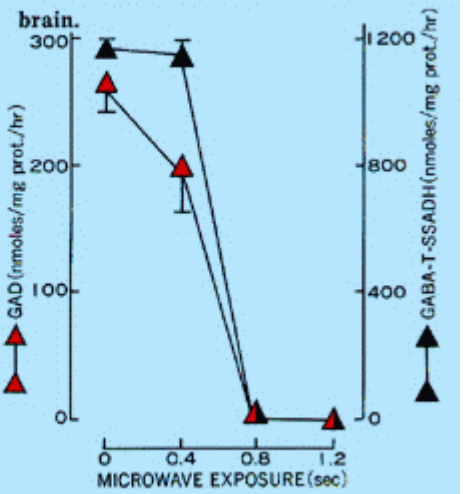


Fig.4 Effect of microwave irradiation on AC and cAMP-PDE activities in rat brain.

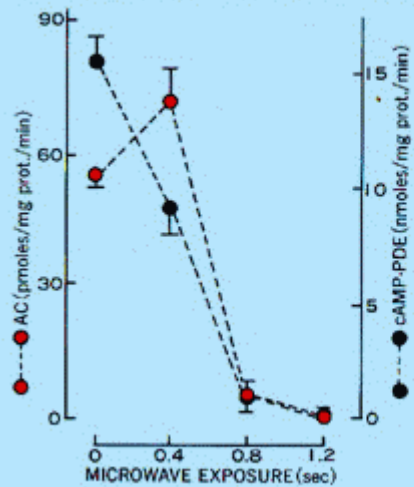
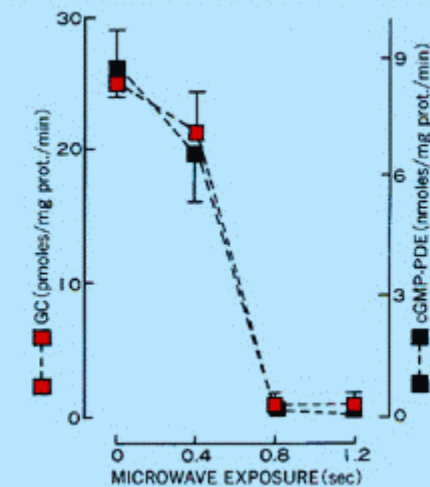


Fig.5 Effect of microwave irradiation on GC and cGMP-PDE activities in rat brain.

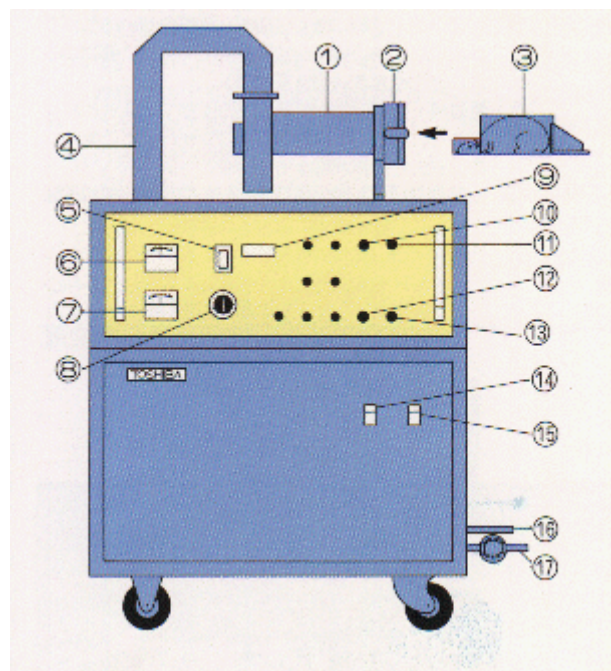


Male Wistar rats weighing 150–200g were exposed to microwave irradiation at a power level of 5KW for the period indicated. After the irradiation whole brain minus cerebellum was homogenized and subjected to each enzymatic assay. Each value represents the mean \pm S.E. obtained from 3 separate experiments.

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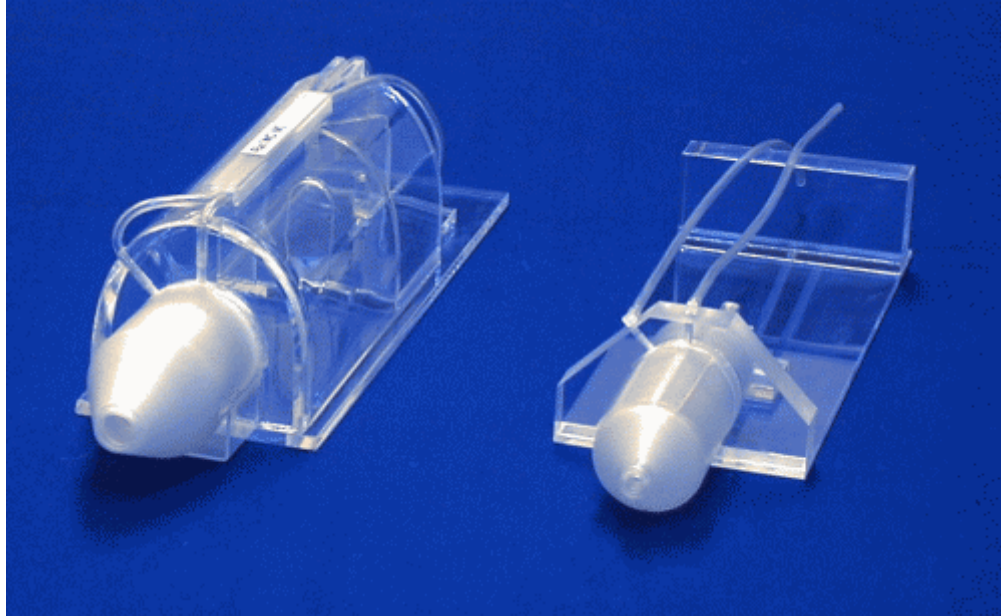
栗山欣弥・村松 信・結城武彦

「中枢薬理におけるマイクロウェーブ照射法の理論と応用」(1981年ソフトサイエンス社)より抜萃。



| APPLICATOR HEAD | SUITABLE ANIMAL HOLDER |
|-----------------|--|
| TAW-174A | WJM-Mouse for 20-50g |
| TAW-424SA | WJR-S for Rats 150-250g |
| TAW-424M | WJR-L for WJR-M for 250-400g 400-500g |

Water-Jacketed Animal Holders (Left:Rat Holder Right:Mouse Holder)



| The Standard System Includes: | |
|---|---|
| Main Unit (TMW-4012C) | 1 |
| Applicator Head (Any one from the list) | 1 |
| Animal Holder (Any one from the list) | 1 |
| Dust Cover | 1 |

| SPECIFICATIONS | |
|------------------------|--------------------------------|
| Oscillator | Toshiba Magnetron 2M68(A) |
| Microwave Power Output | 10 KW max. |
| Oscillation Frequency | 2.450±30 MHz |
| Cooling Requirements | Water Cooling |
| Water Flow | 3 litter/min |
| Exposure Time | 0.01-2.99sec (0.01sec steps) |
| Pausing Time | 3 min |
| Power Consumption | 9.7 KVA |
| Frequency | 50 or 60 Hz |
| Power Requirements | 200/220VAC 60A 3Phase |
| Outside Dimensions | 935W x 640D x 1,310 mmH |
| Weight | Approx. 240 kg |