

AUTHORS: Daels J:DATE: 1976TITLE: Microwave heating of the uterine wall during parturition.SOURCE: J Microwave Power 11:166-68

## MAIN SUBJECT HEADING:

AN  
ANALYTICS(HU)  
HUMAN  
EFFECTSAT  
ANIMAL  
TOXICITYIH  
WORKPLACE PRACTICES-  
ENGINEERING CONTROLSM  
MISCELLANEOUS

## SECONDARY SUBJECT HEADINGS:

AN

HU

AT

IH

M

Physical/Chemical Properties

Review

Animal Toxicology

Non-occupational Human  
Exposure

Occupational Exposure

Epidemiology

Standards

Manufacturing

Uses

Reactions

Sampling/Analytical Methods

Reported Ambient Levels

Measured Methods

Work Practices

Engineering Controls

Biological Monitoring

Methods of Analysis

✓ Treatment

Transportation/Handling/  
Storage/Labeling

MR 1606

examined. Corticosterone levels in the first 24 hours of life ranged from 10-25  $\mu\text{g}\%$  then dropped and remained at  $<2 \mu\text{g}\%$  through the 14th day. The increased levels during the first day of life are no doubt a reflection of maternal corticosterone and response to the stress of birth. Plasma thyroxine (T4) levels in the neonatal rat were low ( $<3 \mu\text{g}\%$ ) for the first 10 days of life in pups from both exposed and non-exposed dams. At days 11-12 a rise in plasma T4 levels to 4-8  $\mu\text{g}\%$  (normal adult levels) was seen in both groups. Newborn rats do not have the capacity to respond to cold stress by significant increase in metabolic rate. This capacity increases during ontogeny and is virtually complete by 4 weeks of age. Whether exposure to microwaves during the gestational or early neonatal perturbs or actually modifies ontogeny of temperature regulation is an important consideration that should be investigated. The effect of microwaves on the developing animal has not been adequately investigated. Such studies would be of significance in obtaining knowledge of maturational biology. For example, if microwave exposure altered one maturational process (i.e. temperature regulation) but not another (maturation of the thyroid gland), it could be concluded that interference with thyroid activity was not in the pathway that led to the alteration in temperature homeostasis in exposed animals. This could lead to other studies to unravel the successive interdependent steps that led to the altered development. It is also possible that certain times in neonatal life are "critical", and the presence or absence of specific or general stress, i.e. radiation, malnutrition, at a given moment may result in a permanent deficit or delay in development. The importance of the central nervous system and brain development in maturation processes makes it potentially more susceptible to derangement than other factors involved in maturation. Application of these stresses provides a tool for dissecting out the ontogeny of a particular regulation while also pinpointing perturbations which could suggest possible hazards to man.

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5A.4

MICROWAVE HEATING OF THE UTERINE WALL DURING PARTURITION

J. Daels (Belgium)

Application of heat is an old method of relieving painful menstrual uterine cramps. No attempt has been made so far to attenuate the pain of uterine contractions during labor by microwaves. Microwave heating has opened new possibilities in this field, prompting us to apply this form of heat therapy in obstetrics.

Microwave heating of the uterine wall during parturition was carried out in a selected group of 2000 patients from whom obstetric pathology was excluded. The apparatus used for the purpose was the Radarmed 12 S 230 with the curved Grossfeldstrahler widefield radiation electrode. This curved electrode allows concentric, even applications to the abdomen and is particularly suitable for transcency of the pregnant uterus. Treatment was applied intermittently only during the uterine contractions. The dose administered varied between 80 and 100 mA. The results were compared with a control-group of 2000 patients where pregnancies and deliveries were similar.

*Analgesic effect.* Of the 2000 patients treated in this manner, 1936 described the analgesic effect as good, the remaining 64 experienced only moderate attenuation. In both groups 100 mgr meperidine was administered for sedation if

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required, and when necessary, a second 100 mgr dose was injected. The average dose of meperidine was significantly lower in the "transcalency-group" (see Table).

*Duration of parturition.* Comparison of the average duration of the dilation stage in these two study-groups revealed a significant shortening of the average duration of the dilation period in those receiving microwave transcalency, amounting to 108 minutes for primiparae and 43 minutes for multiparae. This acceleration was localized mainly in the latent phase. It became manifest when microwave transcalency was applied for 30-40 minutes during the contractions (see Table).

DURATION OF STAGES OF LABOR IN PATIENTS HAVING MICROWAVE TRANSCALENCY AND IN CONTROLS

Group and Number of Patients	Av. Duration of 1st Stage (min)			Av. Duration of 2nd Stage (min)	Av. Duration of 3rd Stage (min)	Av. Dose of Sedation* Required (mg)
	Latent Phase	Active Phase	Total			
Microwave Transcalency						
Primipara 732	290	162	452	26	6	120
Multipara 1268	170	62	232	15	8	100
Controls						
Primipara 756	401	192	593	30	7	194
Multipara 1244	220	78	298	20	9	170

\* Meperidine

*Effect on Uterine contractions.* By 48 patients the effect of the transcalency of the uterine wall on uterine contractions during the latent phase of the dilation period was investigated. The contractions were registered by means of the "open tip method". In all cases a stimulation of frequency and intensity of the contractions could be observed 10 to 15 minutes after starting the transcalency.

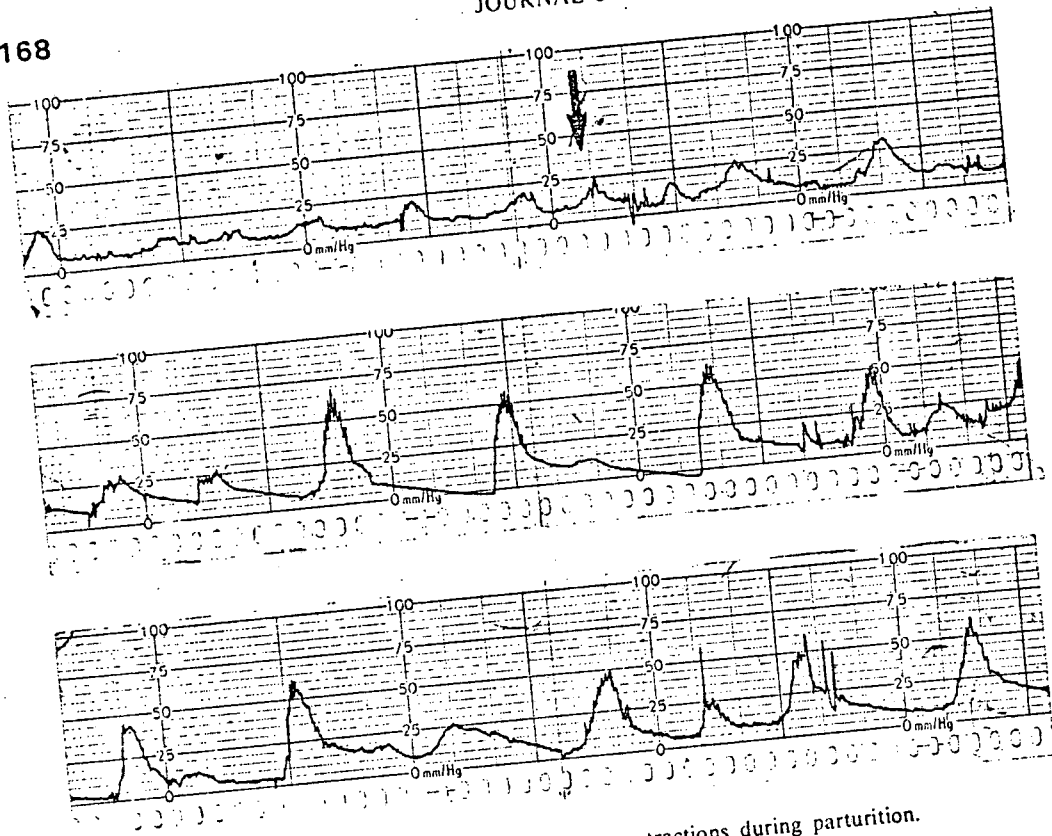
*Effect on the pH of the fetal blood.* By 210 primiparae without obstetric pathology the value of the pH of umbilical artery and vein was determined immediately after birth and compared with the values obtained by 210 patients selected in the same way but where no transcalency was applied.

In the group with transcalency the mean value of the pH of the umbilical artery comported 7.36 and of the umbilical vein 7.41. In the identical control-group without transcalency, values of 7.26 of the umbilical artery and 7.33 of the umbilical vein were obtained. In the identical control-group without transcalency, values of 7.26 of the umbilical artery and 7.33 of the umbilical vein were obtained.

*Effect on fetal hypoxia.* In 24 high-risk deliveries where determinations of the pH of fetal blood were made during parturition, an increase of the value of the pH of more than 0.2 was observed in 11 cases, 20 minutes after starting the transcalency of the uterine wall.

*Adverse effects.* No adverse side-effects of microwave heating of the tissues were observed. After intermittent microwave transcalency during parturition the temperature of the amniotic fluid was never above 36.5°C. The temperature of the newborn was slightly increased but never exceeded 37.8°C.

(Klinick Maria Middelaers, Gent, Belgium.)



Effect of transclency of the uterine wall on uterine contractions during parturition.  
 Registration of the contractions by means of the "open tip method".  
 By starting of the transclency, followed, after 16 minutes, of a stimulation of the contractions.

5A.5

MICROWAVE THERAPY AND MUSCLE BLOOD FLOW IN MAN

D. R. McNiven and D. J. Wyper (U.K.)

Microwave therapy was found to increase significantly muscle blood flow in man from a mean resting value of 2.9 ml/100g/min to 11.4 ml/100g/min. In contrast, short wave diathermy, infra red irradiation, pulsed electromagnetic therapy, ice and massage produce no significant effect.

Previous reports in the literature have shown that the effects of infra red irradiation, ice, short wave diathermy, pulsed electromagnetic energy or massage on muscle blood flow are insignificant. Animal experiments, however, have suggested that microwave therapy may be more effective in producing an increase in perfusion. The purpose of this study was to investigate the effect of microwave therapy on muscle blood flow in man.

Muscle blood flow was measured using the xenon-133 clearance technique. 200 microCuries of the inert diffusible radioactive tracer xenon-133 dissolved in 0.1 ml of sterile isotonic saline was injected into the muscle (vastus lateralis). A scintillation counter was used to monitor the count rate of  $\gamma$ -rays emitted by the xenon-133, thereby enabling the rate of clearance of xenon, and hence the blood flow, to be measured. From a single injection muscle blood flow can be measured



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