were removed by laparotomy at the eighteenth day
ch is one to two days prior to birth. The exper-
med double blind, that is, both the irradiation and
performed without the knowledge of the exposure

2866 fetuses from 273 litters were examined. The
shows the average fetal weight and number of
of the seven exposure conditions.

EXPOSURE TIME (Sec)	NUMBER OF FETUSES	AVERAGE WEIGHT (GM)	PERCENT CHANCE (RE: SHAM)
300	837	1.15	--
300	411	1.08	- 6.1
300	263	1.04	- 9.6
20	441	1.07	- 7.0
20	210	1.05	- 8.7
10	498	1.07	- 7.0
10	206	0.94	-18.3

metric Kruskal-Wallis statistical test showed that
l weight reduction, shown in the table is signifi-
level ($P \alpha \leq 0.001$).

Jr., C.L. Christman and S. Yarrow, (1974).
oeffect Exposure System. In 1974 Ultrasonics
ceedings (ed by J. deKlerk) pp. 57-64, IEEE Cat. #
SU, New York.
). The Mouse. Burgess Publishing Co.
Jr., M.L. Shore, R.K. Fred and W.M. Leach, (1972).
ment of Risk to Ultrasound. In 1972 Ultrasonics
ceedings (ed by J. deKlerk) pp. 486-490, IEEE Cat.#
SU, New York.

ULTRASONIC TOXICITY STUDY OF THE MOUSE REPRODUCTIVE SYSTEM AND THE PREGNANT UTERUS+

F. J. Fry, F. Dunn*, J. Brady*, W. D. Erdmann, P. Strang, Rozsa Kohn*, I. Baird and J. Cobb*
Indianapolis Center for Advanced Research, Indiana University School of Medicine, Indianapolis, Indiana 46202
*Bioacoustics Research Laboratory, Dept. of Electrical Engineering, University of Illinois, Urbana, Illinois 61801

This research is concerned with ultrasonic irradiation of the male mouse testes, the non-pregnant female mouse ovaries and the pregnant mouse uterus. A transcutaneous approach is used for the male testes and the pregnant uterus while a skin incision is made to permit accurate placement of the focused sound field over the ovaries. The animals are irradiated under Metofane anesthesia and are suspended in a 37°C temperature controlled degassed mammalian Ringer's solution. One aspect involves ultrasonic irradiation of 1MHz fundamental sound frequency delivered in short bursts (several μs to 125 μs) at a 1000Hz repetition frequency. These delivery regimes are meant to approximate those presently used in clinical diagnostic medicine. Spatial peak intensities and average intensities generated in this delivery mode are selected at maximum values to produce readily identifiable bioeffects. Animals are then irradiated in a graded reducing set of ultrasonic dosage regimes from this maximum. A continuous wave (c.w.) delivery format is also being used so that an intercomparison between c.w. and clinical relevant pulse regimes can be compared with regard to specific bioeffects. Bioeffects are recorded of a histological (light microscope level of specific organ and tissue sites), functional and gross structural (fetal teratology and gross tissue changes) nature. Irradiated males are tested for their ability to impregnate known quality females and the delivered litters are assayed. Irradiated non-pregnant females are tested for conception and litter delivery by mating with known quality males. Fetal status is assessed for Caesarian section delivered litters from animals irradiated over the uterine horns at day 8 or 9 post-conception as evaluated by plugging.

In order to achieve the necessary sound intensities (spatial peak intensities of 1000-1500 watts/cm^2 and time average intensities 30-150 watts/cm^2) to elicit grossly observable bioeffects in the short burst regimes, a focused ultrasonic beam is used. Multiple sound beam positions are used to cover the desired irradiation site. Each beam position involves an irradiation period of 20 seconds. For the c.w. regime, fewer beam positions are needed to cover a specific site because of the relative ease in obtaining the necessary ultrasonic intensities for irradiation with a beam of larger lateral dimensions than that used for the short burst regime.

Dosage conditions have been determined for the production of a late cage death syndrome (animals apparently recovered from the irradiation sequence, but die at periods from 12 hours to 2 weeks post-irradiation). This condition occurs for time average sound intensities in the short burst regimes in the range of intensities mentioned above. In this range of intensities for the short burst regimes, animals (male and female) which survive are functionally capable from a reproductive viewpoint. There is a high incidence of reduced fetal weight (0.6gm-1.0gm for individual fetuses compared to 1.2gm for fetuses from control animals) and size in the progeny of irradiated males and non-pregnant females, and a small reduction in numbers of fetuses in the litter (10% reduction) at these very high intensities. Irradiated pregnant females show some increase in resorption sites with little increase of gross structural fetal teratology.

The c.w. regimes show similar phenomena at lower intensities (10 watts/cm^2). There appears to be a higher incidence of fetal teratology in the c.w. regime for the pregnant female series.

The numbers of irradiated and control animals at present (approximately 1000) has just now begun to permit a statistical evaluation of the data which will be available in the next several months.

+This research supported by National Institutes of Health Grant No. RO1-FD00665-03.

EARLY POSTPARTUM MORTALITY FOLLOWING ULTRA

Karen A. Curto
Division of Biological Effects
Health, Food and Drug Administr
HFX-120, Rockville, MD 20852

The use of ultrasound for diagnostic
tions is increasing.[1] Cautions based on l
biological consequences of exposure and th
search have been expressed.[2] As part of a
effects of prenatal exposure, time-mated C
utero on the 13th day of gestation (the pe
genesis). The exposure system and procedu
where by O'Brien et al.[3] Briefly the proc
tizing the pregnant female mouse, positioni
on-axis 24 cm from the surface of the trans
saline bath maintained at 30° C. The trans
posure of 1 MHz CW ultrasound with an effe
7.9 square cm. Exposure times were 3 minut
(accuracy ± 30%) were sham, 0.125 W/cm^2 (lo
and 0.5 W/cm^2 (high) spatially averaged ov
ating area of the transducer in the free ex
Choice of power levels was based on earlier
tory which suggested that these levels were
terfere with the mother's ability to raise
partum or weaning.

All litters were randomly reduced in s
after birth. Reduction was done to insure
all pups. A record of death of pups, femal
or cannabalism was maintained for each litt
nificant effect occurred for survival rate.
spring dying before the twenty-first day po
4.2%, low 14.4%, medium 13%, and high 26.7%
on a total of 450 pups where numbers before
low 132, medium 108, and high 90. These to