

A SIMPLE ABDOMEN PHANTOM OF PREGNANT WOMEN
AT VHF BAND

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Recent years, radiofrequency devices, which are usually placed in the vicinity of the human body, have been widely used. Pregnant women may be exposed to the electromagnetic (EM) waves radiated from these devices, e.g., portable radio terminals, induction heating cookers, etc. It is therefore necessary to evaluate the EM exposure to a fetus inside pregnant women.

To the authors' knowledge, several papers on the evaluation of the EM exposure to the fetus have been published. However, in those papers, the structure of the pregnant women was inaccurate. In addition, little is known about the dielectric constants of the amniotic fluid and fetus, because the measurement of such values is quite difficult. Therefore, an accurate structure of the model and the dielectric constants of the fetus are indispensable to evaluate the precision EM exposure to the fetus.

In this paper, firstly, the dielectric constants of the amniotic fluid and fetus of rabbits are measured, because the electrical properties of mammals are almost equal to those of the human. As a result, it has been confirmed that the conductivity of the amniotic fluid and fetus is 1.8 and 1.3 times larger than that of the muscle of an adult at 150 MHz. Next, a simple abdomen model of pregnant women, which is composed of three different types of tissues, based on measurements of magnetic resonance imaging (MRI) tomograms is introduced. Finally, the SAR inside the abdomen model close to a short dipole antenna, which has the same axial length of the normal mode helical antenna (NHA), is calculated by the FDTD method at 150 MHz. As a consequence, the local 10-g SAR in the fetus is less than 34 % of that in the mother's body. From these investigations, the abdomen model including the amniotic fluid is necessary to evaluate the SAR in the fetus.

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