

Trial of Ultrahigh-speed Network Technologies for Telediagnosis and Telesurgical Treatment of Fetal Diseases

Nursing and medical management of fetomaternal and neonatal patients are becoming increasingly important in Japan, especially with the recent rapid decline in the birth rate. Although prenatal treatment is becoming increasingly significant, the number of fetal medicine specialists in Japan is still small compared with other countries, and pregnant women with diseased fetuses are occasionally unable to receive adequate perinatal care and management.

In the field of telemedicine, various communications systems intended for remote medical treatment have been developed and tested, including conventional video systems and commercial Internet-based technologies. However, these systems are either very expensive or too vulnerable to be used for critical applications due to inherent problems such as inadequate network quality and security of transmitted medical information and the inability to provide the high-definition images needed for telediagnosis.

To overcome these difficulties, NTT has launched a joint investigation with the National Center for Child Health and Development (NCCHD) in Tokyo to create a new fetal telemedicine system that can transmit large volumes of data with a small delay over the GEMnet2 ultrahigh-speed network. From March 1, 2006 to March 31, 2007, NTT and NCCHD will test the feasibility of transmitting digitized fetal medical images, including 3-dimensional (3D) ultrasound and fetoscopic images, between the USA and Japan. Other medical institutions participating in this study will include the Fetal Treatment Center at the University of California at San Francisco and the Advanced Fetal Care Center at the Children's Hospital Boston.

The main experiments are as follows.

- Evaluation of medical image transmission
 - (1) Evaluation of the transmission of 3D ultrasound scanner video and endoscopic images encoded using an MPEG2 codec developed by NTT
 - (2) Evaluation of the transmission of high-definition video based on the high-definition TV standard
- Evaluation of network technology quality
 - (3) Examination and evaluation of network technologies to obtain the quality and confidentiality required for medical information

If these experiments are successful, they will enable the establishment of fetal telediagnosis and treatment technologies. NTT will be able to combine positive experimental results with its world-leading next-generation, ultrahigh-speed network technologies to promote greater network quality and security and drive forward its R&D and coordination activities from a more global perspective. Connection with GÉANT (a research network backbone linking EU member countries), for example, is expected to open up new possibilities for collaboration with European medical centers.

NCCHD is planning to build networks among medical centers intensively involved in advanced prenatal diagnosis and treatment, founding a wide range of fetal telemedicine fields while promoting research work in the USA.

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