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„EMISPHER as a tool to avoid the digital divide of the world“

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EMISPHER as a tool to avoid the digital divide of the world

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INTRODUCTION

Telemedicine aims at equal access to medical expertise irrespective of the geographical location of the person in need. New developments in information and communication technologies (ICT) have enabled the transmission of medical images in sufficiently high quality that allows for a reliable diagnosis to be formulated by the expert at the receiving site [Graschew2000], [Graschew 2001]. At the same time, however, these explosive developments in ICT over the last decade bear the risk of creating and amplifying a digital divide in the world. EMISPHER (Euro-Mediterranean Internet-Satellite Platform for Health, medical Education and Research) is dedicated to bridge and avoid such a digital divide by establishing an equal access for most of the countries of the Euro-Mediterranean area to real-time and on-line services for healthcare in the required quality of service.

MATERIALS AND METHODS

EMISPHER provides an integrated internet-satellite platform for the application of various medical services (medical e-learning, real-time telemedicine and medical assistance). The platform includes a bi-directional satellite network (up to 2 Mbps) between 10 Centres of Excellence in the Euro-Mediterranean region (Morocco, Algeria, Tunisia, Egypt, Cyprus, Turkey, Greece, Italy, France and Germany; see Fig. 1) and employs ViaSat Linkway technology. All the 10 EMISPHER pilot sites have also been equipped with the powerful video communication system WoTeSa (Workstation for Telemedical applications via Satellite) / WinVicos (Wavelet-based interactive Video communication system) directly connected to the satellite terminal. The system includes a PC (Pentium IV, >3GHz, 512 MB RAM), two high resolution video cameras and the WinVicos software implementing a high performance video codec. Detailed information about WoTeSa and WinVicos can be found in ref. [Graschew2003].

RESULTS

The formation and operation of the EMISPHER Virtual Medical University (EVMU) for e-learning (teleteaching) is one of the main efforts in the project. In the EVMU it is planned to use real-time broadcast of lectures, live surgical operations and pre-recorded video sequences etc., as well as web-based e-learning applications. The target population of the EVMU is comprised of medical students (both undergraduate and postgraduate), university hospital staff, general practitioners and specialists, health officers and citizens.

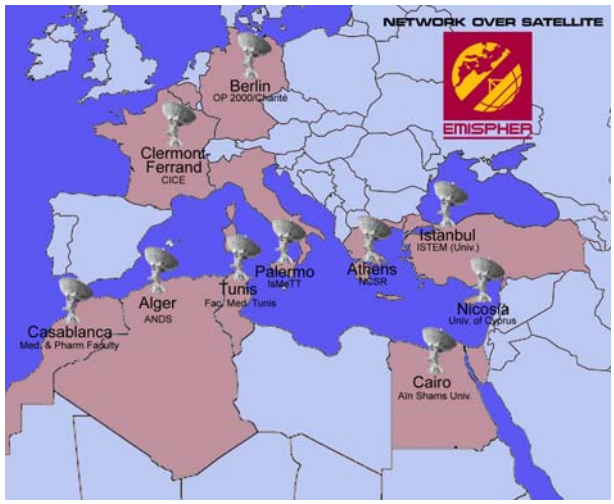

Fig. 1: EMISPHER network via satellite connecting 10 Centers of Excellence in the Euro-Mediterranean region

Each of the leading medical centers provides pedagogical material and modules for synchronous and asynchronous e-learning in their medical specialities: endoscopic surgery, gynaecology-obstetrics, reproductive medicine, infections diseases, interventional radiology, liver transplantation and tumour diagnosis and therapy.

The central gateway to EVMU is the project's website: www.emispher.org. From here, users have access to the content of the various modules and can register for the participation in real-time e-learning events.

Some of the multimedia teaching material needs to be presented in real-time. Live transmission of surgical operations from operating theatres, lectures, etc. from one site to one or several sites simultaneously (point-to-point or multipoint) are possible in the network between the 10 partners (see Fig. 2).

Real-time telemedicine refers to those applications that involve live transmission of medical data and concomitant live teleconsultation of the remote expert. Successful real-time telemedicine applications exhibit several key factors such as a sufficiently high communication bandwidth that is also economically affordable and intelligent data compression modules that allow for a

drastic reduction of the required bandwidth.

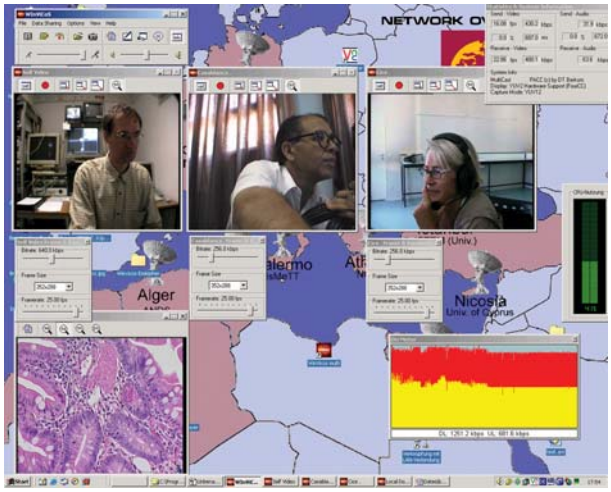

Fig. 2: Teleteaching via multipoint connection between Berlin, Casablanca and Clermont-Ferrand. Sending of a histopathological document

EMISPHER has set up a satellite-based network for real-time telemedicine applications using the combined WoTeSa and WinVicos modules for real-time telemedicine (see Fig. 3). In the field of real-time telemedicine the following categories of applications are offered: second opinion, teleteaching & teletraining (demonstration and spread of new techniques), telementoring (enhancement of staff qualification), and undergraduate teaching courses and optimisation of the learning curve. The leading medical centers in the project provide expertise in the following medical fields: open and minimally-invasive surgery, multi-organ transplantation, endoscopy, pathology, radiology, interventional imaging, neurology, infectious diseases, oncology, gynaecology and obstetrics, reproductive medicine, etc. These real-time telemedical applications contribute to improved quality of patient care and to accelerated qualification of medical doctors in their respective speciality.

The third field of service operated in EMISPHER is medical assistance. As tourism constitutes a substantial economical factor in the Mediterranean region and because of the increasing mobility of the population, continuity of care through improved medical assistance is of major importance for improved healthcare in the Euro-Mediterranean region. Introduction of standardised procedures, integration of the platform with the various local communication systems and training the medical and non-medical staff involved in medical assistance allow for shared management of files related to medical assistance (medical images, diagnosis, workflow, financial management, etc.) and thus for improved care for travellers and expatriates.

Fig. 3: Teleconsultation between Berlin, Algiers and Palermo. A live video sequence of an ultrasound investigation is transmitted and a diagnosis formulated by connected experts

CONCLUSION

EMISPHER fosters cross-Mediterranean cooperation between the leading medical centers by establishing a permanent medical and scientific link. Through the deployment and operation of an integrated internet-satellite communication platform, EMISPHER provides for medical professionals in the whole Euro-Mediterranean area access to services in the required quality of service, thus bridging and avoiding a digital divide. The services of the EMISPHER Virtual Medical University, the applications in real-time telemedicine and the improved medical assistance contribute to an improved level of healthcare in the whole Euro-Mediterranean region.

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