



Portable telepathology: Methods and tools

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Abstract

Introduction: Telepathology is becoming easier to implement in most pathology departments. In fact e-mail image transmit can be done from almost any pathologist as a simplistic telepathology system. We tried to develop a way to improve capabilities of communication among pathologist with the idea that the system should be affordable for everybody. We took the premise that any pathology department would have microscopes and computers with Internet connection, and selected a few elements to convert them into a telepathology station.

Methods: Needs were reduced to a camera to collect images, a universal microscope adapter for the camera, a device to connect the camera to the computer, and a software for the remote image transmit. We found out a microscope adapter (MaxView Plus) that allowed us connect almost any domestic digital camera to any microscope. The video out signal from the camera was sent to the computer through an Aver Media USB connector. At last, we selected a group of portable applications that were assembled into a USB memory device.

Portable applications are computer programs that can be carried generally on USB flash drives, but also in any other portable device, and used on any (Windows) computer without installation. Besides when unplugging the device, none of personal data is left behind. We selected open-source applications, and based the pathology image transmission to VLC Media Player due to its functionality as streaming server, portability and easiness of use and configuration. Audio transmission was usually done through normal phone lines. We also employed alternatively videoconferencing software, SightSpeed for bi-directional image transmission from microscopes, and conventional cameras allowing visual communication, and also image transmit from gross pathology specimens.

Results: The server equipment was prepared to work in several pathology department form different hospitals. Receptors obtain images without any special equipment, in any Internet connected computer. Most of the time there was not need to implement audio connections because conventional phone calls were available to communicate server and receptors, and in this way all the network bandwidth can be dedicate to achieve maximum image quality, and receptors do not need to install special software.

The biggest trouble we found to put into practice the equipment was security restrictions from net administrators that most hospitals and institution have. The only way to solve these situations is getting in touch with net administrators and obtain permit to translate external IP addresses into our computer, and open necessary ports.

Discussion and Conclusions: Portable telepathology can be a very useful, cost effective, and easy to implement method to increase telepathology equipments. Simplicity and effortless solutions can reach the smallest and poorly equipped pathology departments. Limitations for telepathology systems were high cost of equipments and lack of universality. Internet has changed dramatically telepathology possibilities in means of universality. Now price is not necessary a limitation. The goal for the future can be to change the idea of telepathology as a highly technical subspecialty, and reduce it to a new and broad and fully open way of communication among pathologists