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# Establishing Telepathology in Africa: Lessons From Botswana

## **Abstract**

Few reports of telepathology in Africa exist in the medical literature. With the strong need for improvement in health care infrastructure and personnel training in many African nations, telepathology provides a rapid and versatile tool to improve clinical care and foster educational and research opportunities. We describe the challenges faced in establishing robotic telepathology (RT) services at a government referral center in Botswana and reflect on conditions under which such initiatives may be most likely to succeed in sub-Saharan Africa and other parts of the developing world.

## **Keywords**

Africa, telepathology, dermatology, improve clinical health, education

## **Disciplines**

Dermatology | Medical Education | Medicine and Health Sciences

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# Establishing telepathology in Africa: Lessons from Botswana

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## To the Editor

Few reports of telepathology in Africa exist in the medical literature. With the strong need for improvement in health care infrastructure and personnel training in many African nations, telepathology provides a rapid and versatile tool to improve clinical care and foster educational and research opportunities. We describe the challenges faced in establishing robotic telepathology (RT) services at a government referral center in Botswana and reflect on conditions under which such initiatives may be most likely to succeed in sub-Saharan Africa and other parts of the developing world.

The Africa Teledermatology Project (<http://africa.telederm.org>) has been providing dermatology support to local providers throughout Africa using store-and-forward teledermatology/teledermatopathology since 2007. While the outcomes have been very positive, and similar telemedicine platforms are well accepted,<sup>1,2</sup> this method is limited by the number and quality of images available to the consultant (Fig 1) and by reliance on the referring provider, who may lack dermatopathology training,<sup>3</sup> to produce representative photomicrographs.

In response to these problems, we installed a Zeiss Mirax Live RT system (Carl Zeiss MicroImaging GmbH, Jena, Germany) at the National Health Laboratory in Gaborone, Botswana in 2009. With up to 4 slides placed on the motorized microscope, the consultant controls stage position, focus, and magnification remotely (Fig 2).

Certain factors facilitate the achievement of a functioning telepathology service:

1. Availability of reliable histologic processing sets a ready stage for implementing telepathology. Telepathology systems must also be robust enough to handle significant heterogeneity in slide quality, focal planes, and specimen types/sizes.
2. Adequate Internet connectivity and a stable power source are crucial. We installed a dedicated wireless broadband connection. An uninterrupted power supply (UPS) device was necessary to protect the equipment, which was configured to operate at local voltage.

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Conflicts of interest: None declared.

3. Demand for specialized pathology services is driven by concomitant availability of specialized clinical services (eg, dermatopathology in areas with practicing dermatologists). Given the professional isolation in this region, telepathology can enable solo pathologists to meet such demands, as well as to participate in continuing education and collaborative research.
4. Governmental support is critical in logistical matters such as waiving of customs fees. Applying for a rebate certificate with the assistance of local partnerships circumvented this.
5. Personnel with sufficient technical expertise to install and maintain the equipment are necessary when there are no in-country vendor representatives. For RT, identify individuals familiar with computer hardware, software, and light microscopy. Remote technical support is possible via screen-sharing, Internet telephony, and e-mail. Overstock wearable components such as microscope bulbs, which may need frequent replacement.

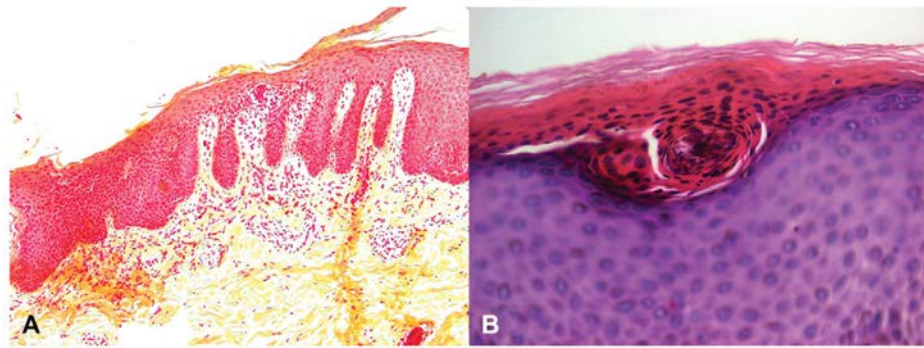
In conclusion, telepathology is feasible in resource-limited settings, and its routine use can improve clinical care and education. The generalizability of our experience is limited by differing socioeconomic and health conditions in Botswana compared with other African nations; thus similar initiatives must be adapted to local settings. On-site technical prerequisites include tissue processing capacity, high-speed Internet, power stability, and personnel to install and maintain the equipment. Select a system that accommodates the types and sizes of specimens requiring consultation, differences in slide quality, and international bandwidth limitations. Local health professionals and government must support the initiative to fuel demand for such services and ensure ongoing utilization. Further research will need to evaluate changes in service utilization over time, effects on development of local expertise, and cost-to-benefit analysis of telepathology in these settings.

## Acknowledgments

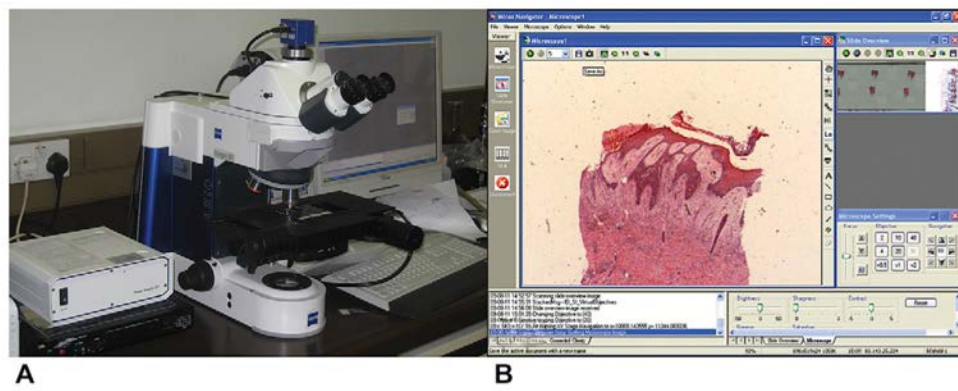
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**Fig 1.** Store-and-forward method. **A**, Color distortion may be a problem. **B**, Blurry still images result from multiple focal planes. (**A** and **B**, Hematoxylin-eosin stain, original magnifications: **A**,  $\times 5$  [ final diagnosis: cutaneous T-cell lymphoma]; **B**,  $\times 40$  [ final diagnosis: scabies].)



**Fig 2.** Robotic telepathology system. **A**, The RT system consists of a motorized microscope connected to a server. **B**, Screenshot of the RT remote user interface with stage position, focus, and objective controls.