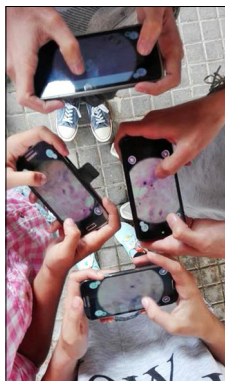


Games

Gamers join real-life fight against malaria and tuberculosis



Despite major progress in the last 15 years, the reduction of the burden of malaria and tuberculosis remains a key objective for global health. Between 2000 and 2014, 43 million lives were saved through effective diagnosis and treatment, but the new UN Sustainable Development Goals include the ambitious aim to end all epidemics of these treatable infectious diseases by 2030. Now a new instrument to help this further effort to diagnose malaria and tuberculosis early is available for everyone. A lot of people are wasting time playing aimless videogames: now they can help to diagnose suspected cases of malaria and tuberculosis by playing the games MalariaSpot and TuberSpot.

MalariaSpot and TuberSpot are online games and downloadable mobile phone applications of which the goal is to count malaria parasites and tubercle bacilli. TuberSpot was designed by researchers of the Technical University of Madrid (Madrid, Spain) and was launched on World Tuberculosis Day in 2015; MalariaSpot was launched 3 years earlier on World Malaria Day 2012 by the same group. It only takes 1 minute of training to master the necessary parasite and bacillus hunting skills, so plenty of time to game on. The game starts with a tutorial, you learn how to differentiate parasites or bacillus from white blood cells and artifacts. Thereafter, you practice on training samples—the app logs all scores, both correctly identified parasites and bacteria as well as the mistakes—and afterwards you are presented with the real deal: samples that you have to sift through to unmask possible deadly culprits.

A few years ago, a study investigated whether anonymous volunteers with no previous (medical) experience would be able to count malaria parasites in digitised images of thick blood smears by playing a web-based game. Players from 95 countries worked their way through more than 12 000 games in 1 month, and generated a database of more than 270 000 clicks on the blood smear images. The results showed that combining the results of 13 non-expert players, who had been trained for only a minute, achieved a parasite counting accuracy higher than 99%—a score just as good as an expert microscopist. However, no conclusions can be drawn about detecting extremely low parasitaemias. Spurred on by these promising results, the bright minds behind MalariaSpot also developed the TuberSpot game.

The game designers say they want to provide a free, ubiquitous, instantaneous, and universal diagnosis through medical image analysis. They call the games “kick-off proof-of-concept experiments”. “TuberSpot

is a simple experiment, which will allow us to continue exploring the opportunities that collaborative games and social networks can offer us to tackle global health issues”, explains Miguel Luengo-Oroz, principal investigator of the project on the TuberSpot website. The next step would be the development of a microscope in a mobile phone. This system would allow direct data transfer from fieldworkers and health centres to the game for rapid diagnosis. This could enable a low-cost system with the possibility of large-scale expansion, accessible to anyone.

To prove that online gaming is the way forward, a part of the spot-team travelled to Mozambique for Operation TuberPlas at the end of 2015. Both MalariaSpot and TuberSpot were separately tested on December 17 and 18, 2015, respectively. As many players as possible needed to demonstrate that collective remote diagnosis is possible. The TuberPlas team took photos of samples of patients and uploaded them to the Spot apps, allowing players to help to diagnose them in real time. The collective results were returned to the Health Research Center of Manhica, Mozambique, where they were compared with the results of an expert microscopist. The gold standard for diagnosing consists of manually counting the number of parasites or bacilli through a microscope. This process takes about 20 mins for an expert microscopist. At the moment, there are not enough experts to do this work so any help is welcome.

Getting together enough gamers should not be the problem, since worldwide more than a billion people play videogames. TuberSpot and MalariaSpot are not the only “games to cure” that uses the collective force of players to analyse data. For example, Cancer Research UK launched Genes in Space a few years ago. By playing this game you can analyse large amounts of genetic data to help speed up cancer research. These relatively new gaming concepts look like a good opportunity to distribute the images all over the world and recruit people willing to help. However, it is important to be conscious of the fine line between gaming fun and potential health risk because the Spot applications present real cases and the diagnosis can change a person’s life. That aside, MalariaSpot and TuberSpot are out-of-the-box inventions matching the digital generation. We should use the unique capacity of online games to achieve more involvement in global health problems. So, help and play for 1 minute against malaria and tuberculosis.

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For MalariaSpot see
<http://malariaspot.org/en/>
 For TuberSpot see
<http://tuberspot.org/en/>
 For the study see
J Med Internet Res 2012; **14**: 167