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CORRESPONDENCE

Reply to correspondence letter by Prashanth GP: quantitative buffy coat (QBC) test for rapid diagnosis of malaria

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We thank Dr. Prashnanth for his overview on the quantitative buffy coat (QBC) test as an alternative method for malaria diagnosis. Indeed, QBC was developed as an alternative to the conventional Giemsa-stained blood film (GBF), but several practical, economical, and diagnostic limitations impair its use in routine diagnosis in nonendemic settings, as will be explained below.

QBC offers the advantage of rapid diagnosis compared to GBF, but this advantage—as stated by Dr. Prashnanth—is of particular value in high workload settings. In laboratories with few malaria requests, the rapid diagnosis by QBC is flawed by several disadvantages. First, special and expensive equipment is needed. Despite the recent introduction of the cheaper LED fluorescence microscope, the equipment and consumables per sample are more expensive than those for the GBF. Second, both preparation and examination of QBC require a considerable amount of training and expertise, which in centers with few malaria requests is difficult to achieve. Third, the stain used for QBC, acridine orange (AO), has strong fluorescence capacities but is nonspecific as it stains nucleic acids from all cell types [5]. Besides, AO is also taken up by parasite debris, hampering differentiation between current and past infection [3, 7]. Moreover, potential safety hazards may occur during performance of QBC [1]. Another important disadvantage is that differentiation between the different malaria species is hardly possible. Finally, QBC is not a quantitative assay: determination of parasite density as recommended by the World Health Organization cannot be provided.

Apart from these practical limitations, field studies reported variable diagnostic accuracies for QBC [5]: in general detection of *Plasmodium falciparum* is good except at low parasite densities. However, reported specificity for *P. falciparum* is 93% and for the non-*P. falciparum* species only 50%. Although Nandwani et al. [6] found high sensitivity and specificity for QBC in a laboratory setting, the other study referred to by Dr. Prashnanth reports false-positive and false-negative rates of both 11% for QBC compared to GBF, increasing up to 65% and 37.5%, respectively, at parasite densities <1,000/μl [1].

Malaria diagnosis in nonendemic settings requires species differentiation and detection of low parasite densities [4]. Because of these requirements, QBC alone is not an alternative to conventional microscopy. Some laboratories in Europe with a high number of requests for malaria diagnosis use QBC as a screening method and perform GBF microscopy only on QBC-positive slides. However, most laboratories in nonendemic settings have a limited number of requests and in case of higher number of requests more laboratory staff is involved [2], diluting the exposure. In that case, malaria rapid diagnostic tests are a more reasonable alternative in terms of costs, training, ease of use, and shelf life.

In conclusion, QBC can provide a rapid diagnosis of malaria but gives no information about parasite density and *Plasmodium* species. In nonendemic settings, it can be used as screening method in high workload settings, but its limitations impair its use in routine diagnostic settings.

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References

1. Adeoye GO, Nga IC (2007) Comparison of Quantitative Buffy Coat technique (QBC) with Giemsa-stained Thick Film (GTF) for diagnosis of malaria. Parasitol Int 56:308–312
2. Gillet P, Mukadi P, Vernelen K, Van Esbroeck M, Muyembe JJ, Bruggeman C, Jacobs J (2010) External quality assessment on the use of malaria rapid diagnostic tests in a non-endemic setting. Malar J 9:359
3. Makler MT, Palmer CJ, Ager AL (1998) A review of practical techniques for the diagnosis of malaria. Ann Trop Med Parasitol 92:419–433
4. Maltha J, Jacobs J (2011) Clinical practice: the diagnosis of imported malaria in children. Eur J Pediatr 170:821–829
5. Moody A (2002) Rapid diagnostic tests for malaria parasites. Clin Microbiol Rev 15:66–78
6. Nandwani S, Mathur M, Rawat S (2003) Evaluation of the direct acridine orange staining method and Q.B.C. test for diagnosis of malaria in Delhi, India. J Commun Dis 35:279–282
7. Ochola LB, Vounatsou P, Smith T, Mabaso ML, Newton CR (2006) The reliability of diagnostic techniques in the diagnosis and management of malaria in the absence of a gold standard. Lancet Infect Dis 6:582–588