

## RETRACTION

doi:10.1038/nature12164

### Retraction: Branched tricarboxylic acid metabolism in *Plasmodium falciparum*

Kellen L. Olszewski, Michael W. Mather, Joanne M. Morrisey, Benjamin A. Garcia, Akhil B. Vaidya, Joshua D. Rabinowitz & Manuel Llinás

*Nature* **466**, 774–778 (2010); doi:10.1038/nature09301 and corrigendum *Nature* **469**, 432 (2011); doi:10.1038/nature09712

We retract this Letter, which reported both reductive and oxidative tricarboxylic acid (TCA) metabolism in *Plasmodium falciparum* parasites ('branched TCA metabolism'). The data for metabolic labelling of TCA intermediates remain reliable, but we have come to realize that the interpretation presented is incorrect. Although there is both reductive and oxidative TCA cycle flux in *P. falciparum*-infected red blood cell (RBC) cultures (as we reported), new data from the Llinás and Vaidya groups (manuscript in preparation) suggests that the reductive flux occurs primarily in the RBCs and not in the parasite itself. Specifically, we have used new enrichment strategies for the parasitized RBCs that enhance our ability to measure *P. falciparum*-infected RBC metabolic activity without excessive interference from surrounding uninfected RBCs. On feeding  $^{13}\text{C}_5$  glutamine, we measured both  $^{13}\text{C}_2$ -succinate and  $^{13}\text{C}_4$ -succinate in the infected RBCs, demonstrating that TCA metabolism in blood-stage *P. falciparum* is not branched but primarily oxidative (cyclic).