
eFigure 1. Relationship between hemoglobin concentration and cerebral tSO2

eFigure 2. Relationship between lactate concentration and cerebral tSO2

eFigure 3. Relationship between thigh tSO2 and cerebral tSO2

eFigure 4. Child with malaria, initial cerebral hypoxemia (tSO2 <65%) and excellent response to transfusion

eFigure 5. Child with sickle cell disease, initial cerebral hypoxemia (tSO2 <65%) and excellent response to transfusion

eFigure 6. Child with sickle cell disease, initial cerebral hypoxemia (tSO2 <65%)

eFigure 7. Child with malaria receiving two RBC transfusions

eFigure 8. Child with malaria and coma

eFigure 9. Cerebral hypoxemia and death

This supplementary material has been provided by the authors to give readers additional information about their work.
eFigure 1. Relationship between hemoglobin concentration and cerebral tSO₂.

The correlation coefficient $r^2 = 0.08$. 
eFigure 2. Relationship between lactate concentration and cerebral tSO₂.

The correlation coefficient $r^2 = 0.02$. 
eFigure 3. Relationship between thigh tSO₂ and cerebral tSO₂.

The correlation coefficient $r^2 = 0.12$
Sex: male; Age: 54 months
Diagnosis: *P. falciparum* malaria with positive test for histidine-rich protein and LDH malaria antigen
Level of consciousness on arrival: No stupor, no coma, no history of seizures
Hemoglobin: 20g/L; Lactate: 14.4mM
Blood Pressure: 79/54 mmHg; Pulse: 125/minute; Respiratory rate: 50/minute
Arterial O$_2$ saturation (finger oximeter): 100%
Initial cerebral tSO$_2$: 61%; Initial extraction ratio: 56%
Final cerebral tSO$_2$: 84%
Area Under Curve during transfusion: 1359
2$^{nd}$ transfusion of RBCs: Yes. 10mL/kg additional RBCs were given due to persistent tachycardia at hour4.
30 day follow-up: good health
eFigure 5: Child with sickle cell disease, initial cerebral hypoxemia (tSO₂ <65%) and excellent response to transfusion.

Sex: male; Age: 27 months
Diagnosis: Sickle cell disease without malaria; Other diagnosis: initial hypoglycemia; bacterial pneumonia
Level of consciousness on arrival: stupor, no coma, no history of seizures
Hemoglobin: 29g/L; Lactate: 13.6mM
Blood Pressure: 133/93 mmHg; Pulse: 149/minute; Respiratory rate: 68/minute
Arterial O₂ saturation (finger oximeter): 85%
Initial cerebral tSO₂: 46%; Initial extraction ratio: 65%
Final cerebral tSO₂: 93%
Area Under Curve during transfusion: 3241
2nd transfusion of RBCs: no
30 day follow-up: good health
eFigure 6: Child with sickle cell disease, initial cerebral hypoxemia (tSO₂ <65%).

Note that the cerebral tSO₂ at the completion of transfusion fails to reach 75%.

Sex: male; Age: 14 months
Diagnosis: Sickle cell disease without malaria; Other diagnosis: bacterial pneumonia
Level of consciousness on arrival: no stupor; no coma; history of seizures
Hemoglobin: 31g/L; Lactate: 20.7mM
Blood Pressure: 94/51 mmHg; Pulse: 163/minute; Respiratory rate: 46/minute
Arterial O₂ saturation (finger oximeter): 100%
Initial cerebral tSO₂: 49%; Initial extraction ratio: 73%
Final cerebral tSO₂: 66%
Area Under Curve during transfusion: 1119
2nd transfusion of RBCs: no
30 day follow-up: good health
eFigure 7: Child with malaria receiving two RBC transfusions.

The cerebral oximeter tracing was continued during a second transfusion of RBCs. Each transfusion was given as 10mL/kg of RBC concentrate over 120 minutes. Note the rise in cerebral tSO2 with each transfusion. Even though the cerebral tSO2 was >75% after the first transfusion, the subsequent further increase in cerebral tSO2 following the second transfusion suggests that the first transfusion alone was insufficient to maximize cerebral oxygenation.

Sex: female; Age: 30 months
Diagnosis: *P. falciparum* malaria with 2+ parasitemia
Level of consciousness on arrival: No stupor, no coma, no history of seizures
Hemoglobin: 28g/L; Lactate: 5.1mM
Blood Pressure: 114/65 mmHg; Pulse: 152/minute; Respiratory rate: 56/minute
Arterial O2 saturation (finger oximeter): 100%
Initial cerebral tSO2: 72%; Initial extraction ratio: 40%
Final cerebral tSO2: 76% after first transfusion
Area Under Curve during transfusion: 487
2^nd^ transfusion of RBCs: Yes. 10mL/kg additional RBCs were given due to persistent low hemoglobin (<50g/L when tested two hours following completion of first transfusion).
30 day follow-up: good health
The child presented in coma and regained consciousness after transfusion and treatment of malaria. Despite a low initial arterial O₂ saturation, note the very high cerebral tSO₂ values (>85%) and the lack of separation between cerebral and thigh tSO₂ readings. The high cerebral tSO₂ values and low oxygen extraction ratio may be the result of very low oxygen demand during coma.

Sex: male; Age: 41 months
Diagnosis: *P. falciparum* malaria with 1+ parasitemia and positive test for histidine-rich protein and LDH malaria antigen
Level of consciousness on arrival: coma with prior seizures
Hemoglobin: 40g/L; Lactate: 15.9 mM
Blood Pressure: 105/67 mmHg; Pulse: 170/minute; Respiratory rate: 38/minute
Arterial O₂ saturation (finger oximeter): 82%
Initial cerebral tSO₂: 82%; Initial extraction ratio: <5%
Final cerebral tSO₂: 88%
Area Under Curve during transfusion: 740
2nd dose of RBCs: no
30 day follow-up: good health
The child presented with a normal level of consciousness in severe respiratory distress with a critically low initial cerebral tSO$_2$ (<50%). Despite transfusion, the child expired at 100 minutes into treatment. Note the terminal decline in cerebral tSO$_2$.

Sex: male;  Age: 10 months  
Diagnosis: Sickle cell anemia without malaria;  Other diagnosis: Pneumonia  
Level of consciousness on arrival: No stupor, no coma, no history of seizures.  
Hemoglobin: 59g/L;  Lactate: 12.3mM  
Blood Pressure: 108/69 mmHg;  Pulse: 165/minute;  Respiratory rate: 62/minute  
Arterial O$_2$ saturation (finger oximeter): 98%  
Initial cerebral tSO$_2$: 42%;  Initial extraction ratio: 81%  
Final cerebral tSO$_2$: 32%  
Area Under Curve during transfusion: 737  
2$^{nd}$ dose of RBCs: no  
30 day follow-up: not applicable; child died at the 100 minute mark.