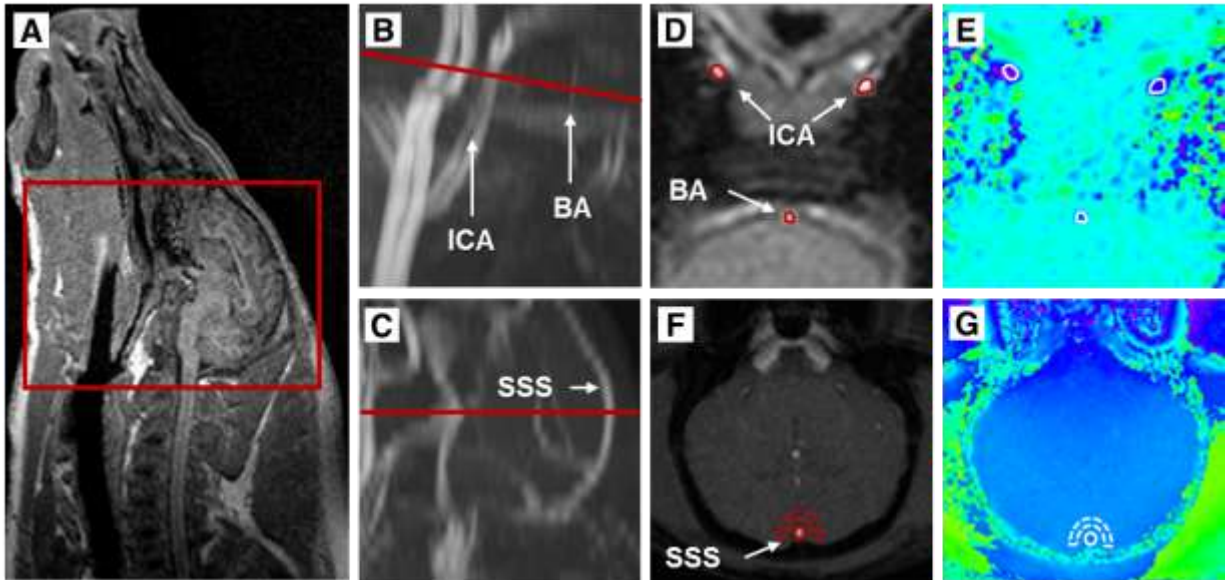


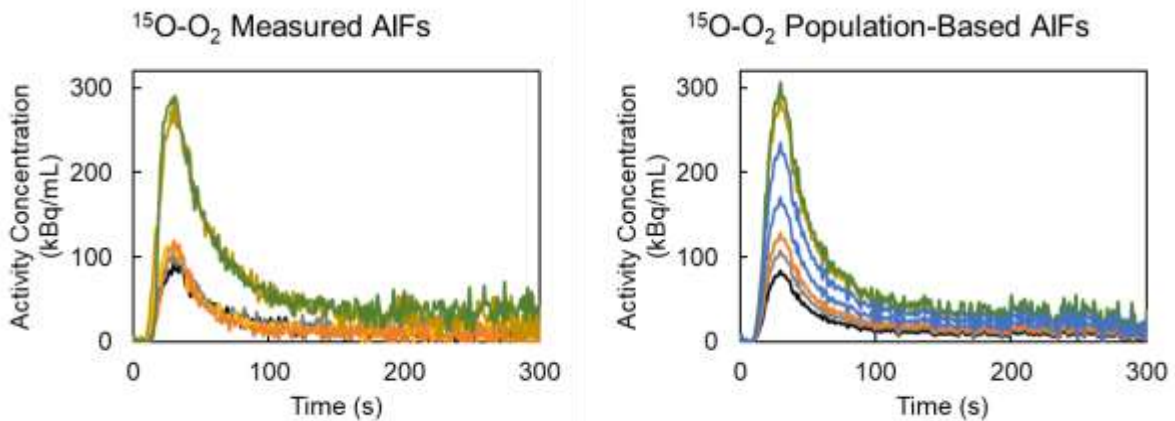
SUPPLEMENTAL DATA

MR Sequences Acquisition and Analysis Scheme



SUPPLEMENTAL FIGURE 1. (A) Sagittal MPRAGE image showing imaging region. MR angiography showing (B) the internal carotid arteries (ICA) and basilar artery (BA), and (C) the superior sagittal sinus (SSS). The red lines represent the slices used to measure WB CBF and S_vO_2 . Magnitude and phase images from the slices used to estimate (D)-(E) WB CBF and (F)-(G) S_vO_2 . The red regions-of-interest were transferred from the magnitude to the phase image (in white). All images are from one representative animal.

Population-based AIFs



SUPPLEMENTAL FIGURE 2. Measured $^{15}O-O_2$ AIFs (left) and their respective scaled population-based curves (right). The blue curves represent the population-based AIFs used for the two animals that arterial sampling failed.

Arterial Blood Measurements

SUPPLEMENTAL TABLE 1. Summary of arterial blood measurements. No statistical differences were identified in any of the parameters across the acquisitions.

	Baseline	LMC
Hematocrit (%)	25.9 ± 3.4	25.7 ± 2.1
Hemoglobin (g/dL)	8.3 ± 1.1	8.3 ± 0.7
Partial pressure of oxygen (mmHg)	230 ± 100	239 ± 102
Partial pressure of carbon dioxide (mmHg)	40.3 ± 4.3	41.0 ± 3.4
S _a O ₂ (%)	99.5 ± 0.5	99.5 ± 0.4
Glucose concentration (mmol/L)	5.5 ± 0.8	5.5 ± 0.4

Glossary of Variables

Variable	Description	Unit
$A_o(t)$	Oxygen-only component of ¹⁵ O-O ₂ arterial input function	kBq/g
$A_w(t)$	Recirculating water component of ¹⁵ O-O ₂ arterial input function	kBq/g
$C_a^o(t)$	¹⁵ O-O ₂ arterial input function	kBq/g
$C_a^w(t)$	¹⁵ O-H ₂ O arterial input function	kBq/g
C_aO_2	Arterial content of oxygen	mLO ₂ /100 mL
$CMRO_2$	Cerebral metabolic rate of oxygen	mLO ₂ /100 g/min
E	Oxygen extraction fraction	
f	Cerebral blood flow	mL/100 g/min
Hb	Hemoglobin concentration	g/100 mL
i	Subscript for local measurements	
k_2	Efflux rate constant of H ₂ ¹⁵ O from blood to brain tissue	min ⁻¹
p	Blood-brain partition coefficient for water	mL/100 g
P_aO_2	Partial pressure of oxygen	mmHg
S_aO_2	Arterial saturation of oxygen	%
S_vO_2	Venous saturation of oxygen	%
V_b^w	Cerebral arterial blood volume (¹⁵ O-H ₂ O)	mL/100 g
V_A^w	Cerebral arterial blood volume (¹⁵ O-O ₂)	mL/100 g
V_0^o	Combination of cerebral arterial and venous blood volumes (¹⁵ O-O ₂)	mL/100 g
t	Time	min
T	Scan time	min
wb	Subscript for whole-brain measurements	