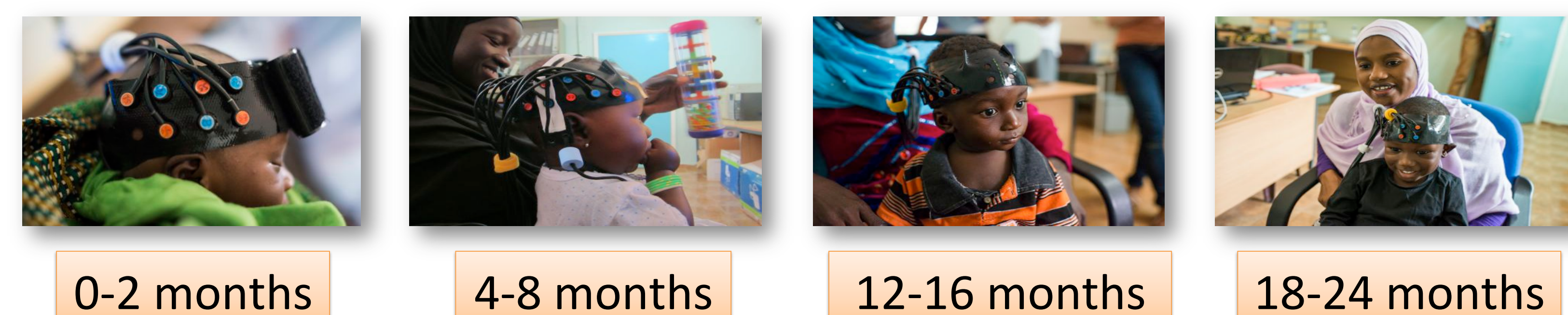
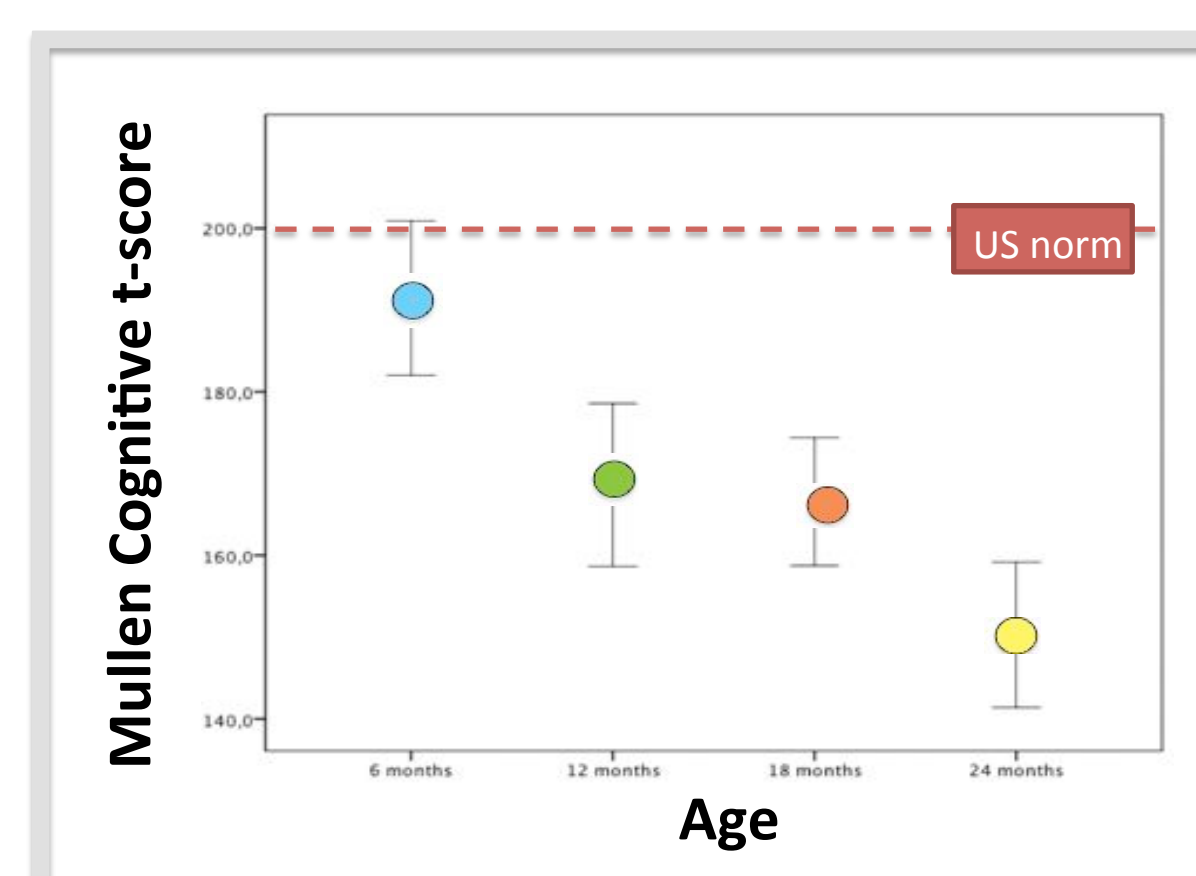
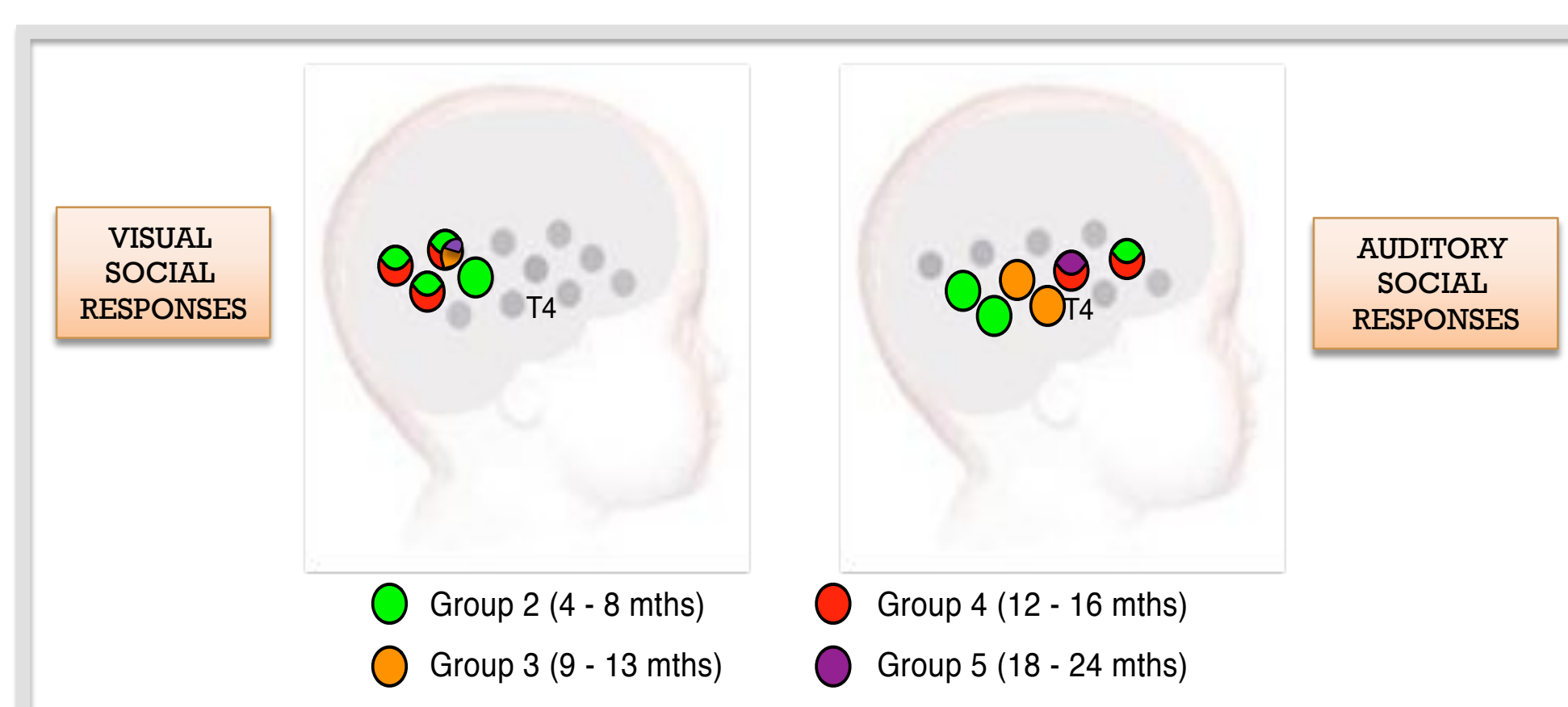


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GCE Phase I Summary

99 infants were studied between birth and 24 months of age: fNIRS, Mullen Scales of Early Learning.

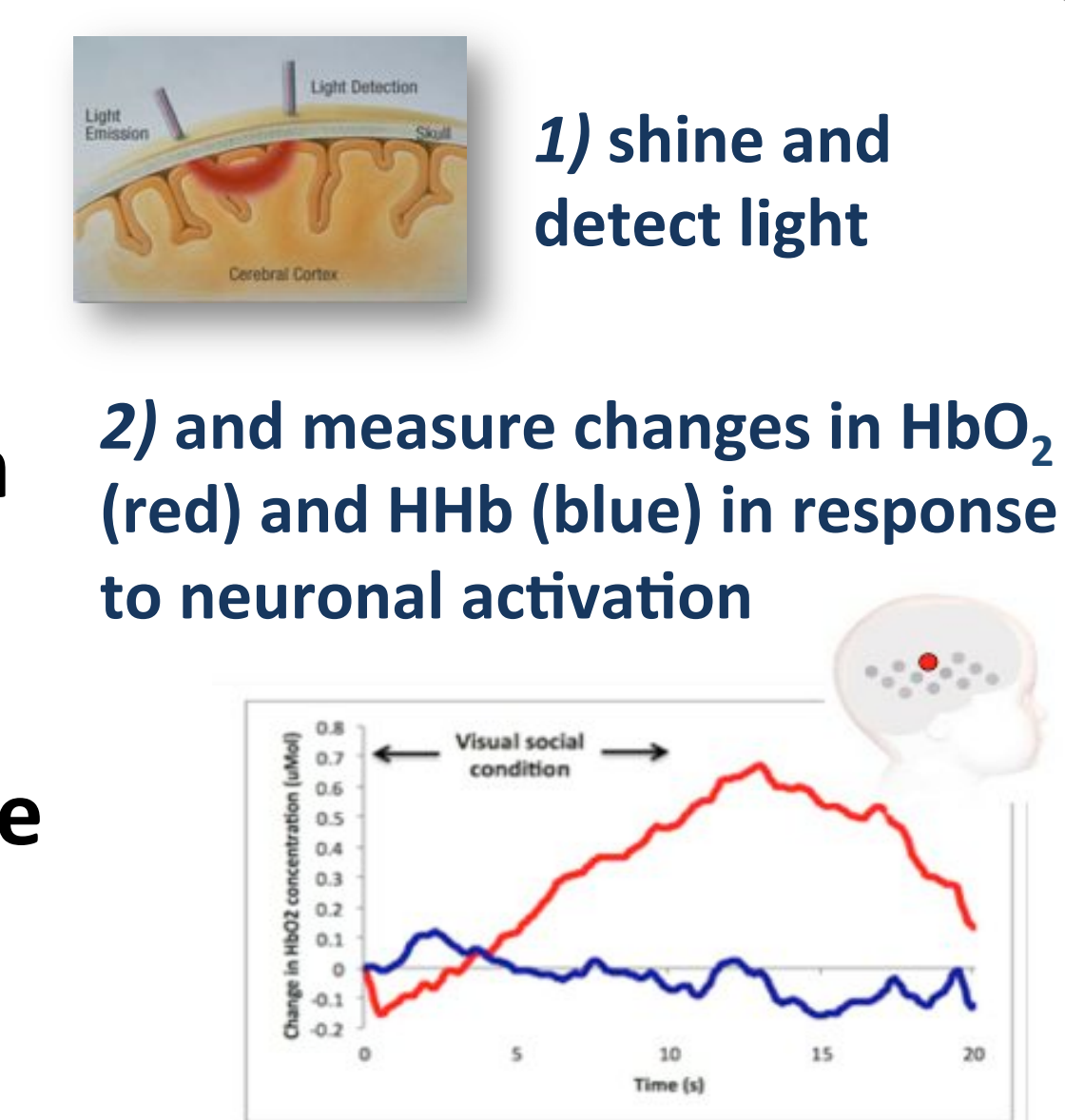


Project Description

- The ultimate aim of the Phase II project is to establish standard curves of brain function-for-age and to use these to identify early biomarkers of disrupted neurocognitive development.
- Our ambition is to redefine what can be investigated in the developing brain of infants at risk in low- and middle- income countries so that we can deliver and assess the efficacy of targeted interventional strategies

Functional Near Infrared Spectroscopy

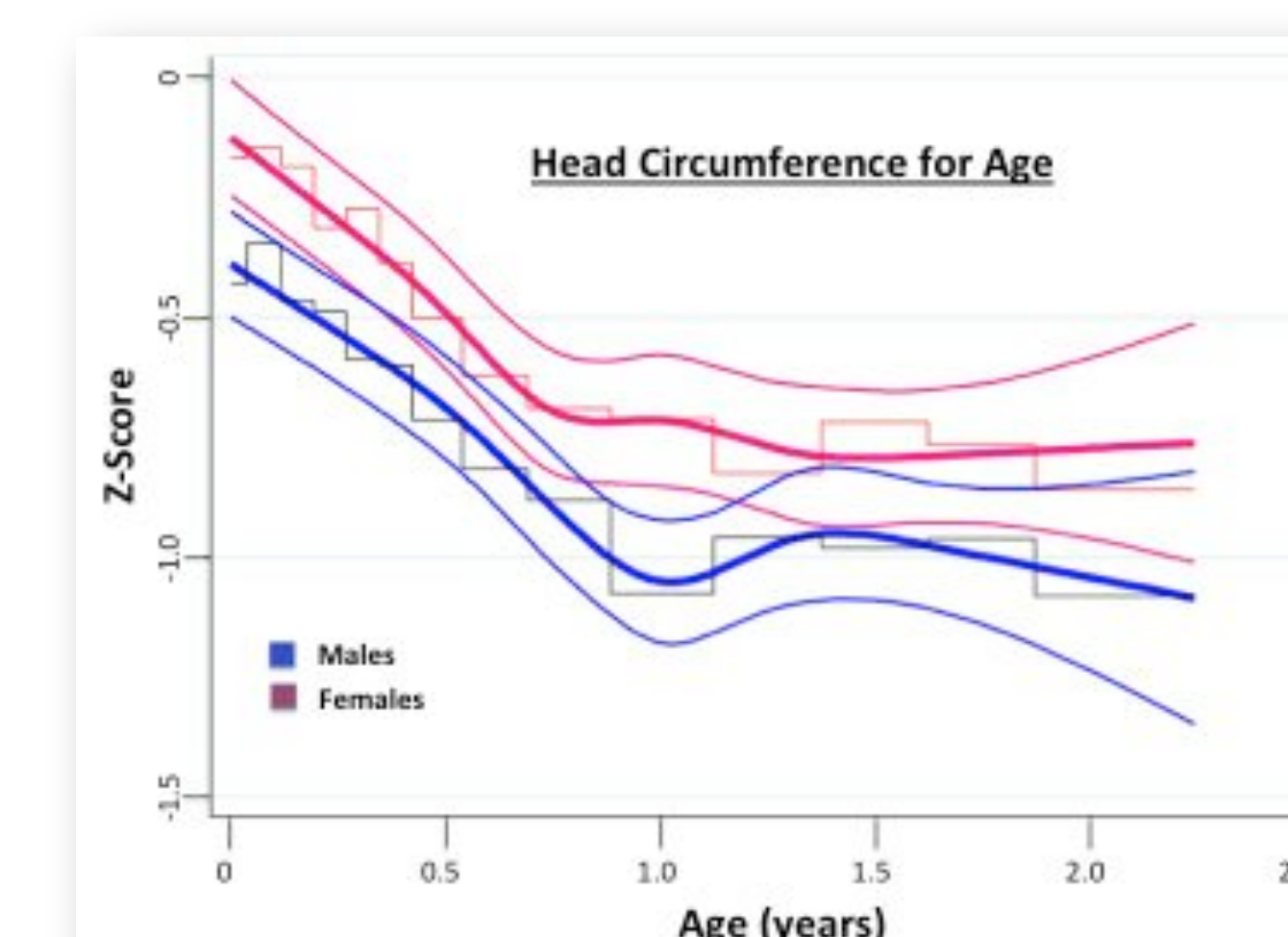
- fNIRS, an optical imaging technique, uses near infrared light to measure changes in brain blood flow and oxygen consumption (oxy- (HbO₂) and deoxy- (HHb) haemoglobin) associated with neuronal activation.
- fNIRS offers superior spatial resolution to EEG, and unlike fMRI, is well suited to field studies. It is completely safe, low cost and requires minimal set up and training.



GCE Phase II Project Outline: Longitudinal study from birth, 1, 5, 8, 12, 18 & 24 months of age

- Two sites: MRC field station, Kenema village, The Gambia
Rosie Hospital, Cambridge, UK.
- fNIRS paradigms: social (SOC), attention (ATT), working memory (WM) and functional connectivity (FC)
- EEG paradigm: auditory oddball (from the Intergrowth study)
- Eye-tracking paradigm (from the Life study)
- Cognitive Development Assessments: Neonatal Behavioural Assessment Scale (NBAS), Mullen Scales of Early Learning (MSEL), Parent-Child Interaction Measures, Child Development Inventory (CDI), Infant Behaviour Questionnaire (IBQ)
- Demographics, Socioeconomic status (SES), Maternal and Infant health and diet, HOME Inventory,
- Anthropometric/Biological measures: Mother (M), Infant (I)

Age (mths)	fNIRS	ERP/ EEG	Growth	Behavioural measures			Question -naire	Biological sample
				Cognitive Assessment	PCI Video	Eye tracking		
Prenatal							Health/ family	M
Birth			Y	NBAS			Health/ family	
0-1	SOC, ATT, FC	Y	Y				Health/ SES	
5	SOC, ATT, FC	Y	Y	MSEL	Y	Y	Health/ Cog Ass	M/I
8	SOC, WM, FC		Y	MSEL	Y	Y	Family/ Cog Ass	M/I
12	SOC, WM, FC		Y	MSEL	Y	Y	SES/ Cog Ass	I
18	SOC, WM, ATT, FC	Y	Y	MSEL	Y	Y	Health/ Family/ Cog Ass	I
24	SOC, WM, ATT, FC		Y	MSEL	Y	Y	SES, Health/ Family/ Cog Ass	I



Faltering head growth is apparent by 12 months of age in rural Gambian infants. Associated neurocognitive ramifications are poorly understood (Moore et al., unpublished).

More Information

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Lloyd-Fox, S., Papademetriou, M., Darboe, M. K., Everdell, N. L., Prentice, A. M., Moore, S. E., & Elwell, C. E. (2014). Functional near infrared spectroscopy (fNIRS) to assess cognitive function in infants in rural Africa. *Nature Scientific Report*, 4:4740, DOI: 10.1038/srep04740



Brain Imaging for Global Health