Race and diurnal variability of biomarkers for diabetes and cardiovascular disease

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Introduction

- Diabetes and cardiovascular disease are two diseases with overlapping aetiologies for which large numbers of people remain undiagnosed.
- Diagnosis for these diseases requires quantification of diverse biomarkers, for which there are known diurnal and racial variation. In spite of this, the diagnostic thresholds for these biomarkers have no diurnal or racial modifiers; they are constant, regardless of patient demographic or time of testing.
- This has the potential to lead to systemic mis- or underdiagnosis.

Methods

- Patient samples from 6449 healthy volunteers at a UK clinical research organisation were analysed for seven diagnostic biomarkers for diabetes and cardiovascular disease.
- The patients were aged 18-76 and for the purposes of this study were categorised as Asian, Black or Caucasian.
- All samples were taken between 8.00 and 18.00.
- All data was anonymised and taken from individuals who had given their informed consent to have their data used this study.
- The seven biomarkers quantified were fasting blood glucose, c-reactive protein, fasting triglycerides, fasting total cholesterol, HDL cholesterol, fasting LDL cholesterol and thyroid stimulating hormone.

Table 1. Cohort demographics

Variable	Statistic	Race			All
		Asian	Black	Caucasian	
Total	n	1370 (21%)	923 (14%)	4156 (64%)	6449
Age	Mean	29	31	32	31
Sex	Female	388 (28%)	404 (44%)	1560 (38%)	2352 (36%)
	Male	982 (72%)	519 (56%)	2596 (62%)	4097 (64%)
Fasted	No	8 (1%)	4 (0%)	32 (1%)	44 (1%)
	Yes	1362 (99%)	919 (100%)	4124 (99%)	6405 (99%)

Results

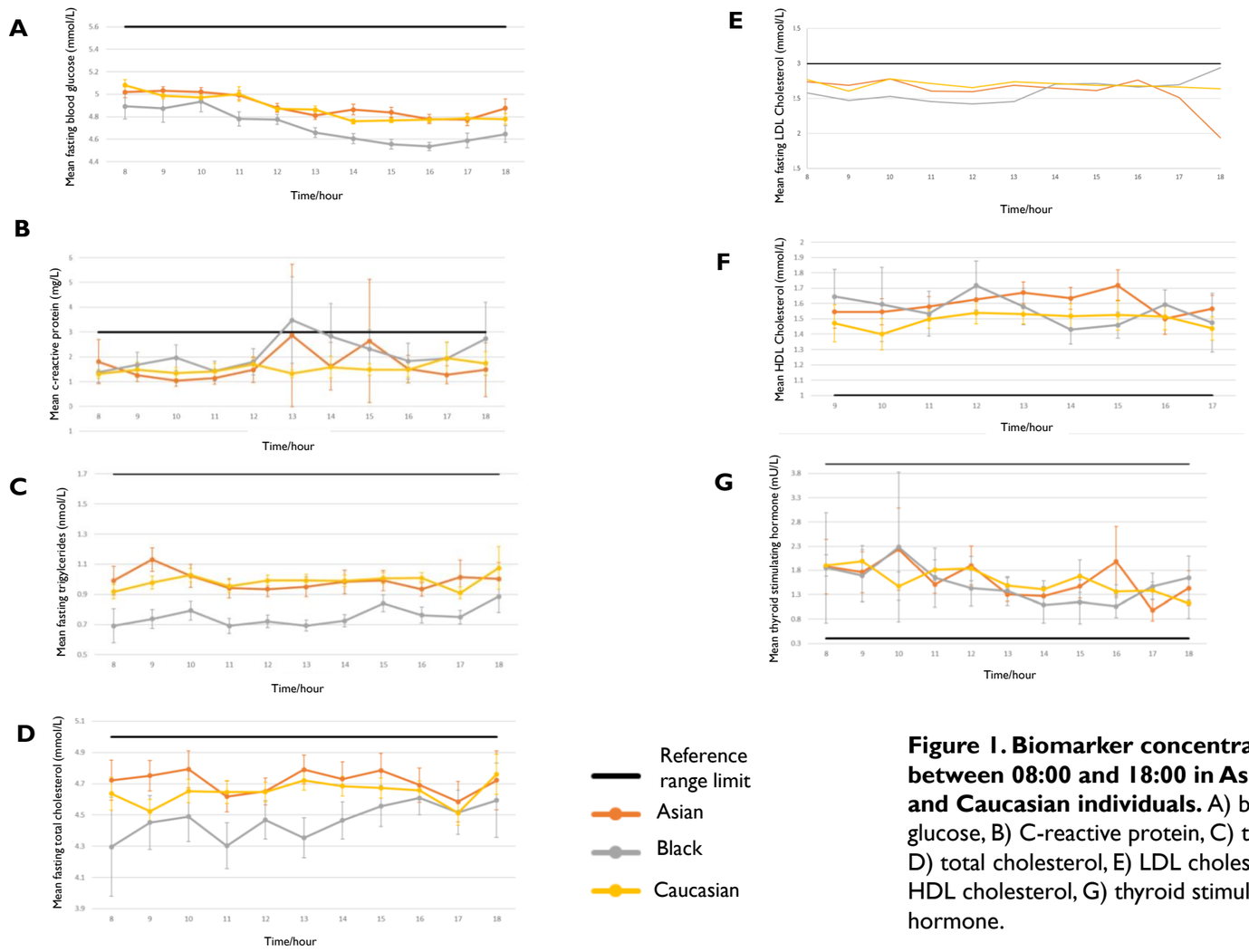

Figure 1. Biomarker concentration between 08:00 and 18:00 in Asian, black and Caucasian individuals. A) blood glucose, B) C-reactive protein, C) triglycerides, D) total cholesterol, E) LDL cholesterol, F) HDL cholesterol, G) thyroid stimulating hormone.

Summary of Conclusions

Significant racial and diurnal variations were identified. Black volunteers had significantly lower fasting blood glucose levels than both Asians and Caucasians. Black volunteers also had the most significant decrease in fasting blood glucose when comparing the afternoon to the morning.

Fasting triglyceride levels and fasting total cholesterol levels were significantly lower for Black volunteers compared to Asians and Caucasians. Differences in HDL cholesterol, fasting LDL cholesterol, c-reactive protein and thyroid stimulating hormone levels were insignificant, though this is potentially due to insufficient sample sizes.

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