

The formation of a Ca²⁺-dependent complex of C-reactive protein and very low density lipoprotein causes the biphasic transmittance waveform

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The “biphasic transmittance waveform” (BTW) refers to a time-dependent decrease in light transmittance that often occurs prior to clotting when performing the activated partial thromboplastin time (aPTT) assay with plasmas of critically ill patients on the MDA[®] coagulation analyzer [1]. Early observations showed an association of the BTW with disseminated intravascular coagulation (DIC) and clinical outcome (see Table 1). The magnitude of the BTW was assessed against in-patient mortality. A total of 346 patients were found to have a BTW on admission to the ITU with a mortality rate of 44%, as compared with 26% for those with normal waveforms. A stepwise increase in the likelihood of mortality was directly correlated with the degree of drop in light transmittance observed on admission (see Figure 1). The mortality fraction was 0.3 in those with normal waveforms versus 0.6 when the light transmittance decreased by 30%.

Table 1. Association of BTW with DIC.

				p*
Education (years)	≤9	10-12	≥13	
CRP (mg/L) crude	1.20	1.07	0.98	0.0001
adjusted§	1.14	1.13	1.10	0.56
Occupation# (status)	a	b	c	
	1.13	1.13	1.04	0.04
	1.15	1.17	1.08	0.12
Household income (DM)	≤2000	2-3000	≥3000	
	1.19	1.11	1.06	0.002
	1.20	1.09	1.10	0.02

*p for difference between upper and bottom category. § adjusted for age, sex, smoking status, BMI, physical activity, and HDL-cholesterol

Conclusions

Detection and analysis of an atypical biphasic aPTT clot waveform is a strong and early predictor of clinical outcome in patients admitted to the ITU. The formation of lipoprotein-complexed C-reactive protein (LC-CRP) is the biochemical basis of the biphasic waveform seen in these patients.

References

1. C Downey, R Kazmi, CH Toh: **Early identification and prognostic implications in disseminated intravascular coagulation through transmittance waveform analysis.** *Thromb Haemost* 1998, **80**:65-69.

