CORRELATIONS BETWEEN HEMAVIEW™ PARAMETERS AND MARKERS OF GASTROINTESTINAL DISTURBANCE

AUTHOR: Linnéa Andersson-McConnell, *BClinSc* Southern Cross University, Lismore, NSW

BACKGROUND INFORMATION

Hemaview™ live blood assessment using darkfield microscopy (LBA-DM) is a microscopic screening technique used to observe non-fixed, unstained, capillary blood. This technique can potentially be used to gain information about a patient's health status by interpreting the morphology and arrangements of blood components. The main aim of this study was to investigate if there was any correlation between the presence of inflammatory markers in Hemaview™ and:

1. Inflammatory markers measured by pathology testing;
2. Liver function tests (LFTs – see Table One);
3. Intestinal permeability test results (see Table Two); and
4. Measures of microbial translocation (see Table Two).

Table One: Enzymes measured as part of LFTs.

ANALYTE	NORMAL RANGE
Alkaline phosphatase (ALP)	30-120 units/L
Alanine aminotransferase (ALT)	4-36 units/L
Aspartate aminotransferase (AST)	5.1-17 µmol/L
Gamma-glutamyl transpeptidase (GGT)	8-38 units/L
Lactic dehydrogenase (LD)	100-190 units/L

Table Two: Tests used in the study to assess GI health.

TEST	INTERPRETATION
Lactulose/mannitol	Involves the oral administration of two inert saccharides which can be absorbed and picked up unchanged in the urine. Mannitol is a small monosaccharide which easily passes through the intestinal mucosa. Lactulose is a large disaccharide which cannot move freely across the intestinal epithelial lining. In a properly functioning intestine, mannitol should be readily absorbed and eliminated in the urine whereas lactulose should not. A high lactulose to mannitol ratio is indicative of increased intestinal permeability.
Lipopolysaccharide binding protein (LBP)	LBP is a protein present in serum that recognises LPS and mediates its immunostimulatory activity. Serum levels of this protein can be used as a marker of bacterial translocation and increased LPS exposure due to intestinal permeability and dysbiosis.
Endotoxin core antibody (EndoCAb)	Another way to indirectly measure LPS is by detecting LPS-antibodies, called EndoCAb testing. EndoCAb are produced by B-cells in response to LPS stimulation; they bind to and clear LPS from the circulation.

METHOD

Thirty-five participants were recruited and divided into two groups (GI symptoms group (n=17) and healthy controls (n=18)) based on screening and symptom scores. Hemaview™ screenings and other pathology tests were usually performed on the same day and the researcher was blinded to participants' data. Hemaview™ LBA-DM parameters measured included fibrin deposition and platelet number and area. Pathology tests included those listed in Tables 1 and 2 as well as ESR and platelet counts. The data were analysed to look for correlations between the Hemaview™ parameters and pathology test results. Results are presented that apply to the whole group and to individual groups as indicated by participant number.

RESEARCH FINDINGS

1. **Hemaview™ parameters of platelet aggregation and fibrin (Figure One) are associated with markers of microbial translocation**

   Statistically significant correlations were found between:
   - Total area of platelet aggregates and LBP (r(18)=0.49; p=0.04); and
   - Fibrin and EndoCAb IgA (r(35)=0.36; p=0.03).

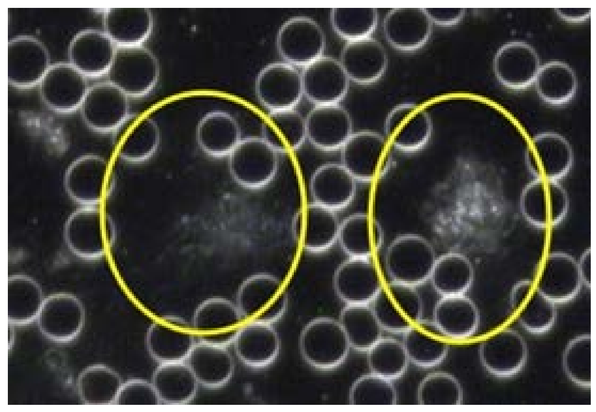

Figure One: Fibrin (left) and platelet aggregates (right).

2. **Hemaview™ parameters of platelet aggregation and fibrin are associated with liver enzyme levels.**

   Statistically significant correlations were found between:
   - Platelet aggregate area and LFT-ALP levels (r(35)=0.34, p=0.05) – see Figure Two;
   - Total area of platelet aggregates and LFT-LD levels (r(18)=0.49, p=0.04); and
   - Fibrin and LFT-ALP levels (r(35)=0.36, p=0.03).

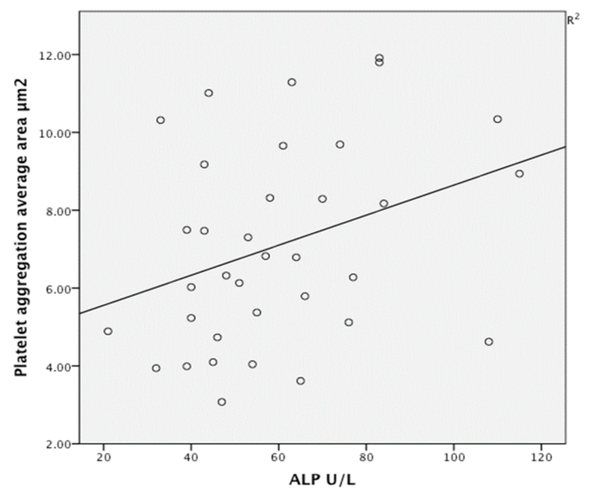

Figure Two: Platelet aggregates correlate with LFT-ALP results.

3. **Hemaview™ parameters of platelet aggregation and fibrin are associated with inflammation.**

   Statistically significant correlations were found between:
   - Number of platelet aggregates and ESR (r(18)=0.54, p=0.02);
   - Fibrin levels and ESR (r(17)=0.59, p=0.01); and
   - Platelet aggregate area and automated platelet counts (r(35)=0.38; p=0.025).

CONCLUSIONS

The results of this study indicated that significant correlations occurred between:

1. The Hemaview™ parameter of platelet aggregation and pathology test results (pathology platelet counts and ESR levels), markers of microbial translocation (LBP levels), and liver enzymes (LFT-ALP and LFT-LD).
2. The Hemaview™ parameter of fibrin deposition and pathology test results (ESR levels), markers of microbial translocation (EndoCAb-IgA), and liver enzymes (LFT-ALP).

REFERENCES

- Andersson-McConnell, L. 2013. The correlation of inflammatory markers in fresh capillary blood observed with darkfield microscopy with inflammatory markers determined by other tests in a population with gastrointestinal symptoms. Honours thesis – Southern Cross University, Lismore (NSW).
- Vojdani A. For the assessment of intestinal permeability, size matters. Alternative Therapies in Health & Medicine, 2013; 19(1): 12-24.
- Moreno-Navarrete JM, et al. Circulating lipopolysaccharide-binding protein (LBP) as a marker of obesity-related insulin resistance. Int J Obes (Lond), 2012; 36(11): 1442-1449.

Contact Details: Linnea Andersson-McConnell: linnea335@yahoo.se

HEMAVIEW™