Lymphocyte to Monocyte Ratio and monocyte subtypes are predictors of severity and outcome in acute ischemic stroke

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INTRODUCTION

- **Monocytes** are heterogeneous cells that play a key role in the pathophysiology of acute ischemic stroke.

- Monocytes can adopt proinflammatory or anti-inflammatory phenotypes according to their expression of lipopolysaccharide receptor (CD14) and Fcg receptor III (CD16)

- Low lymphocyte to monocyte ratio (LMR) has recently been associated with stroke severity and poor long-term outcome.
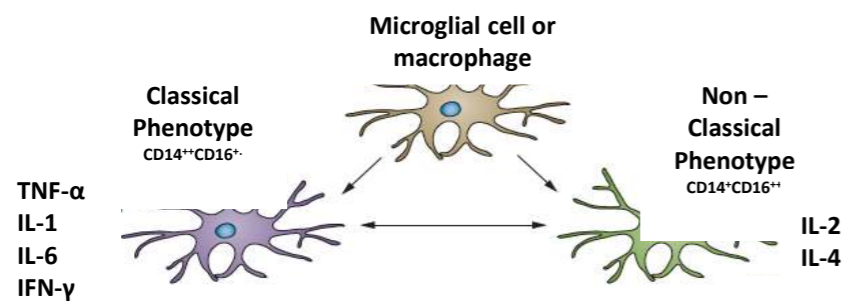
OBJECTIVES & METHODS

We assessed whether LMR, the different monocytes subsets and its cytokines can predict the clinical course and outcome of patients who suffer an acute ischemic stroke (AIS) or transient ischemic attack (TIA)

- Prospective case – control study

- Group of AIS and TIA patients and control group from two stroke units.

- Three blood and plasma samples were collected at acute stage

- Flow cytometry study done at 48 hours

- Quantitative analysis of different cytokines present in the plasma using a customised Cytometric Bead array were performed: **IFN-γ, TNF-α, IL-6, IL-4, IL-2**

- Neurological evaluation of severity was assessed using NIHSS scale and functional outcome using the modified Rankin Scale (mRS)
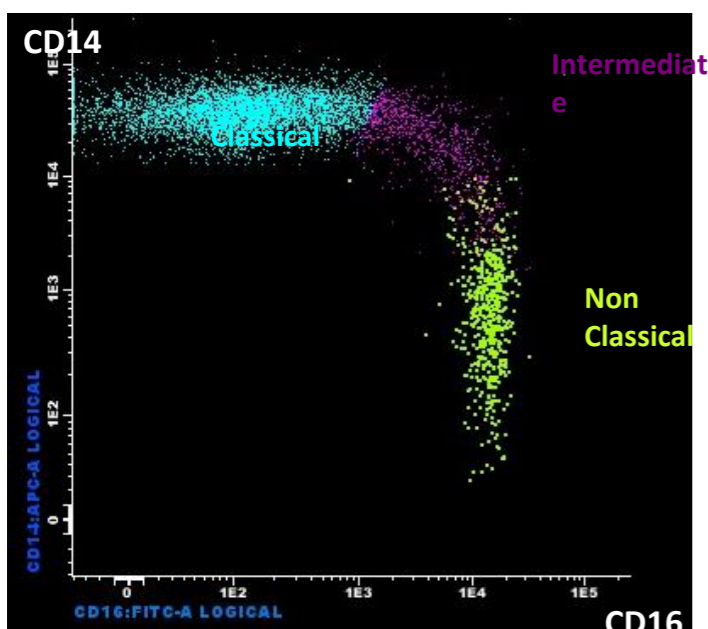
Inclusion Criteria
Age 18 – 100 years
< 12 hours symptoms
No rTPA
No Trombectomy

Exclusion Criteria
No active tumor/infection
No inflammatory disease

Image 1. Monocytes populations in Flow Cytometry

Subsets	Surface Markers	Functions
Classical	CD14++CD16-	Phagocytosis
Intermediate	CD14++CD16+	Proinflammatory
Non-classical	CD14+CD16++	Patrolling

RESULTS

11 patients, 5 controls

- Median age 79 years

- 72% High blood pressure

- Older patients had higher NIHSS and higher mRS

- Lower LMR at 48 hours is associated with higher mRS at 90 days (p = 0.01)

- Lower LMR classic at 48 hours using flow cytometry is associated with higher mRS at 90 days (p<0.01). This association was not seen with intermediate monocytes (IM; CD14+CD16+) and non-classical monocytes (NCM; CD14-CD16++)

- The results show a trend to higher total monocyte count and classical monocyte count in AIS and TIA patients (p = 0.3)

- Total monocyte count is associated with higher NIHSS at 24 hours and Classical monocytes with higher NIHSS at 24h and higher mRS at 90 days, with a trend toward significance (p = 0.07) .This association was not seen with IM and NCM
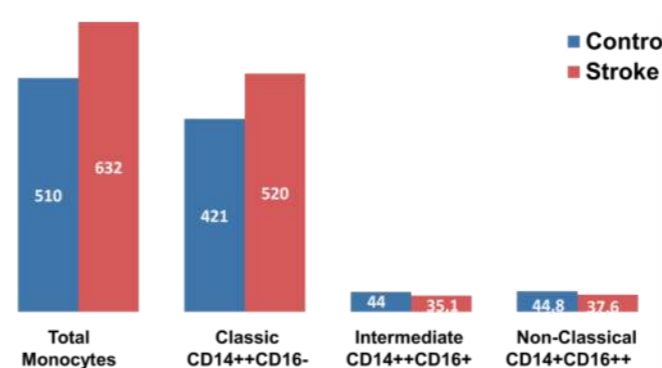

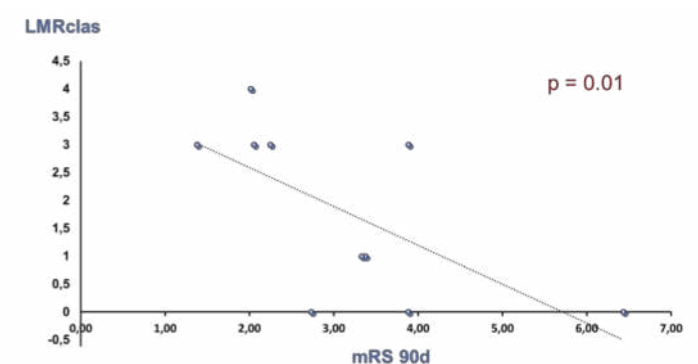Image 2. Monocytes populations in study and control group

Image 3. LMR Classic is associated with functional outcome (mRS) at day 90
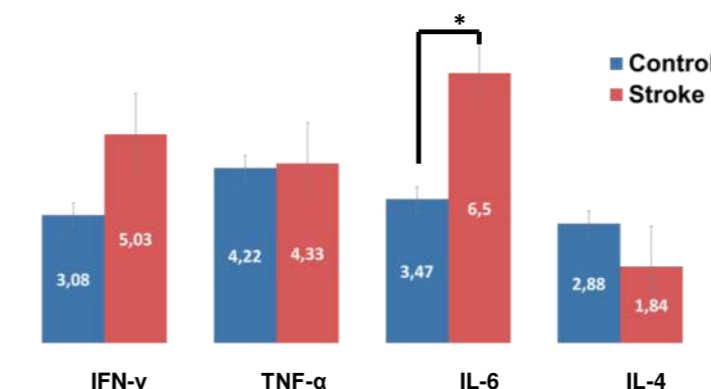

Image 4. Cytokines at acute stage

Baseline levels of IL-6 were higher in study group and was associated with higher basal NIHSS (p<0.02)

CONCLUSION

CM and LMRc may be a predictor of clinical outcome in AIS and TIA patients
These results warrant further research with larger populations