

Improving CD4 T-cell Trending in HIV Patients with a Moving Average Lymphocyte Count

Dorothy Sylvia¹, Clive Landis², Peter Hansen³, Songee Branch⁴

¹PointCare Technologies, Inc., Marlborough, MA, USA

²Edmund Cohen Laboratory for Vascular Research, Chronic Disease Research Centre, University of West Indies, Barbados

³Union Biometrica Tech, Inc., Canaan, New York, USA

⁴Ladymeade Reference Unit, Ministry of Health, Barbados

Background

- In 1990 Malone et al show day to day variability for CD4 higher than for CD4%
- CD4 % more stable but HIV treatment guidelines based on CD4
- We show a method to stabilize CD4 thus retaining and improving its utility for HIV management

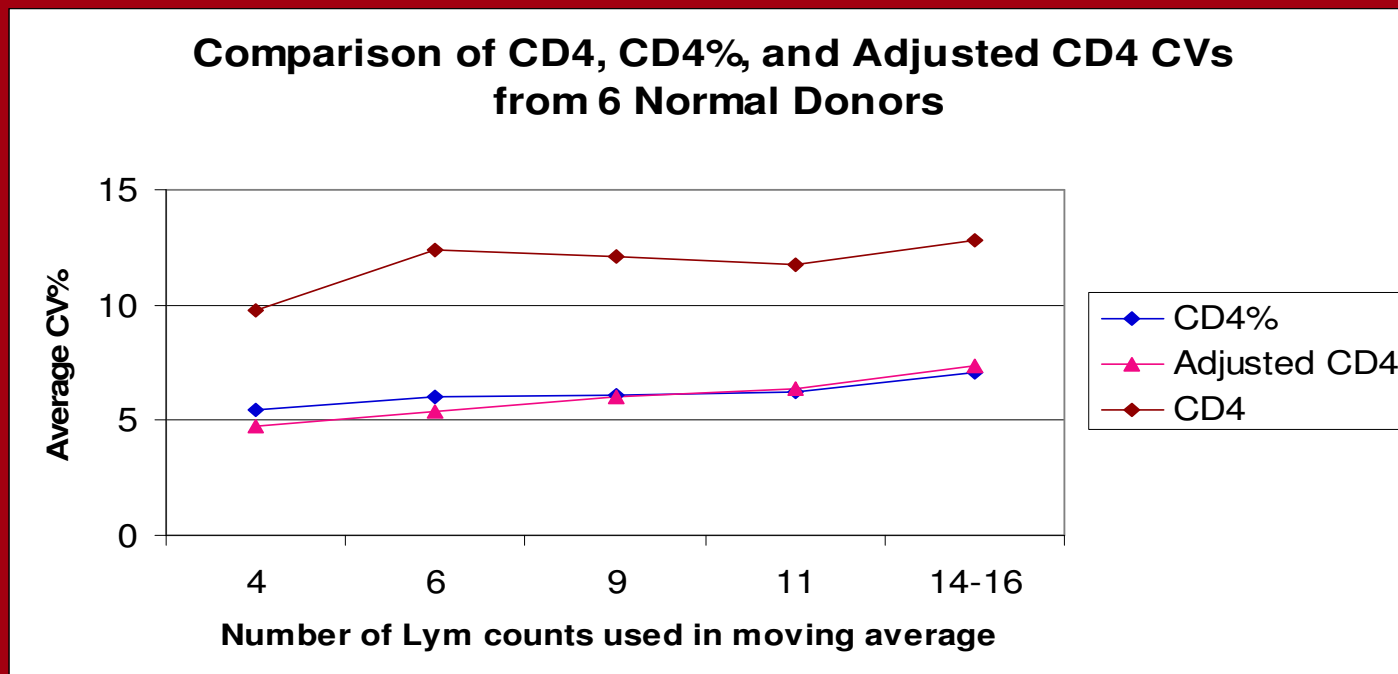
Group	N	Coefficient of Variation	
		CD4	CD4%
Normal	6	16%	5.3%
HIV	12	19%	11%
AIDS	4	28%	13%

Methods

- CD4 counts were collected in the morning over 2 yrs
- Day-to-day CV was calculated for CD4 and CD4%
- CD4 count was adjusted by using present CD4% and moving average total lymphocyte count to compute present CD4
- CVs for moving averages of 4, 6, 9, 11, and 15 points compared to standard CD4 counts in normal subjects
- CD4 count decline was simulated with a lymphocyte drop of 100/yr and CD4% drop of 4%/yr

Results

- Day-to-day variability consistent with Malone et al.
 - CD4 CV = 12%, CD4% CV = 5.5%
- Adjusted CD4 reduced Standard CD4 variability by 50%



Results

- Adjusted CD4 reduced CD4 variability by 2x in Normals and by 1.5x in HIV samples

Group	N	Mean CV (%)		
		CD4	CD4%	Adjusted CD4
Normal (>600)	6	12	6	5
HIV (<350)	3	27	20	20
HIV (350-600)	2	25	19	18

Results

- Simulations of CD4 decline showed improved goodness-of-fit in Adjusted CD4 trend lines
- HIV data was consistent with simulations
- Mean R^2 for simulations and 5 HIV subjects
 - CD4, 0.3
 - CD4%, 0.5
 - Adjusted CD4, 0.5

Conclusions

- Day to day lymphocyte variability causes CD4 count to be 1.5 to 2.0 times more variable than CD4%
- While CD4% is more stable, treatment guidelines are based on CD4 count
- Moving average lymphocyte count using as few as 5 points stabilizes CD4 count
- Treatment guidelines can be retained and used more confidently