gay related immune disease: GRID.

### Innate Resistance to HIV?

Recent research suggests that specific KIR-MHC class 1 gene interactions could control innate genetic resistance to certain viral infections including [HIV](http://en.wikipedia.org/wiki/HIV) and its consequent development of [AIDS](http://en.wikipedia.org/wiki/AIDS).[[3]](http://en.wikipedia.org/wiki/Natural_killer_cell#cite_note-Lannello2008-3) Certain HLA allotypes have been found to determine the progression of HIV to AIDS; an example is the [HLA-B57](http://en.wikipedia.org/wiki/HLA) and HLA-B27 alleles, which have been found to defer progression of HIV to AIDS. This is evident because patients expressing these HLA alleles are observed to have lower viral loads and a more gradual decline in [CD4+ T](http://en.wikipedia.org/wiki/T_helper_cell) cells numbers. Despite considerable research and data collected measuring the genetic correlation of HLA alleles and KIR allotypes, a firm conclusion has not yet been drawn as to what combination provides decrease HIV and AIDS susceptibility. Future research would aim to pinpoint relevant KIR/HLA interactions with aim to produce a vaccine against HIV/AIDS. NK cells can impose immune pressure on HIV, something that had previously been described only for T cells and antibodies [[26]](http://en.wikipedia.org/wiki/Natural_killer_cell#cite_note-sd-26) and that HIV mutates to avoid NK cell activity.[[26]](http://en.wikipedia.org/wiki/Natural_killer_cell#cite_note-sd-26)

HAPI: Attrition – track what the other group is doing. Can we get CM attrition from Lindsey? Data on who gets jobs when? In HAPI are the baseline values lower and thus more room for baseline to 2-month improvement?

By the mid 80’s, the threat of heterosexually transmitted AIDS (or even the threat of transmitting it through bug bites) made for national increase in public concern. 1987 article: predicted 10 million Americans would be infected by 1991. When 1991 came, the CDC reported about 200k.

HIV

The president of South Africa

The public health consensus is that more than 330,000 AIDS deaths and over 170,000 HIV infections can be attributed to the president of South Africa, Thabo Mbeki (tahbo mmbehkey), who became one of the most famous AIDS deniers.

Chigwedere P, Seage GR, Gruskin S, Lee TH, Essex M (October 2008). "Estimating the Lost Benefits of Antiretroviral Drug Use in South Africa". Journal of acquired immune deficiency syndromes (1999) 49 (4): 410–415.

Nattrass N (February 2008). "Estimating the Lost Benefits of Antiretroviral Drug Use in South Africa". African Affairs 107 (427): 157–76.

HIV and AIDS are a big deal. And not treating them as such consistently yields disastrous results.

O’Brien 2009

D-1) CD4 count:

Grinspoon (2000) found an increase of 31 cells/mm3 in the combined

PRE and aerobic exercise intervention group compared to

an increase of 33 cells/mm3 in the non-exercising control group.

Rigsby (1992) found an increase of 58 cells/mm3 in the combined

PRE and aerobic exercise intervention group as compared to a

decrease of 2 cells/mm3 in the non-exercising control group. Lox

(1995) found an increase of 23 cells/mm3 in the PRE group compared

to a decrease of 78 cells/mm3 in the non-exercising control

group. These results were statistically non-significant. In addition,

Rigsby (1992) found non-significant differences in leukocytes,

lymphocytes, CD4, CD8 and CD4:CD8 ratios. Agin (2001) and

Sattler (1999) did not include a non-exercising control group. Sattler

(1999) found a non-significant decrease of 10 cells/mm3 in

the combined testosterone and PRE group and a non-significant

increase of 22 cells/mm3 in the testosterone only group. No other

studies reported pre and post exercise CD4 count outcomes.

Meta-analysis demonstrated a non-significant increase in CD4

count of 31.96 cells/mm3 (95%CI: -28.59, 92.52, n=46) for participants

in the combined aerobic and progressive resistive exercise

groups compared to non-exercising control groups (Rigsby 1992

& Grinspoon 2000) (see Figure 03.01). The confidence interval

indicates a possible positive trend towards an increase in CD4

count for exercisers versus non-exercisers.

Meta-analysis demonstrated a non-significant increase in CD4

count of 48.32 cells/mm3 (95% CI: -6.60, 103.23, n=68) for

participants in the PRE or combined PRE and aerobic exercise

intervention groups compared to non-exercising control groups.

(Lox, 1995, Rigsby 1992 & Grinspoon 2000) (see Figure 01.01).

The confidence interval demonstrates a positive trend towards improvement

in CD4 count in the exercise groups. This improvement

of 48.32 cells/mm3 represents a possible clinically important

trend towards an improvement in CD4 count in the exercise

groups compared to the non-exercising control groups.

No significant changes

were seen with respect to CD4 count or viral load for exercisers

in the five studies that assessed these outcomes, although when

combined, results of the meta-analysis indicated a non-significant

trend towards an increase in CD4 count.

Lastly, results of meta-analysis that demonstrated

no change in CD4 count suggest an element of safety with respect

to immune status for adults living with HIV/AIDS.

O’Brien 2010

All 14 of the included studies assessed immunologic or virologic

outcomes, or both, in the form of CD4 count (all 14 studies)

or viral load (Stringer 1998, Grinspoon 2000, Smith 2001,

Dolan 2006, Driscoll 2004a, Terry 2006).

meta-analyses were completed in this review for immunologic

and virologic outcomes (CD4 count, CD4 percentage,

and viral load)

*Immunuological and virological outcomes:* 50 cells/mm3 to indicate

a clinically important change in CD4 count, 5%to indicate a clinically

important change in CD4 percentage, 0.5 log10copies to indicate

a clinically important change in viral load;

**A-1) CD4 count**

Fivemeta-analyseswere performed.Overall, no significant changes

in CD4 count were found between comparison groups. Metaanalyses

demonstrated no difference in change in CD4 count for

participants in the exercise intervention group compared with the

non-exercising control group (WMD: 18.08 cells/mm3 , 95%con-

fidence interval [CI]: -11.82, 47.99, n=306, *P*=0.24) (LaPerriere

1990, Perna 1999, Smith 2001, Stringer 1998, Baigis 2002, Lox

1995,Mutimura 2008a) Figure 1; no difference in change in CD4

count for participants in the constant aerobic aerobic exercise

group compared with the non-exercising control group (WMD:

-3.11 cells/mm3, 95% CI: -31.06, 24.84, n=261, *P*=0.83) (Lox

1995, Stringer 1998, Smith 2001, Baigis 2002,Mutimura 2008a)

(Figure 2); and a significant trend towards an improvement inCD4

count of 69.58 cells/mm3 for participants in the interval aerobic

exercise group compared with the non-exercising control group

(95% CI: 14.08, 125.09, *P*=0.01, n=45) (LaPerriere 1990, Perna

1999) (Figure 3). The point estimate is above 50 cells/mm3, which

suggests a potential clinically important increase in CD4 count for

interval exercisers compared with non-exercisers. Results showed

no difference in change inCD4 count for participants exercising at

moderate intensity compared with participants exercising at heavy

intensity (WMD: -42.90 cells/mm3, 95% CI: -116.28, 30.47, n=

39, *P*=0.25) (Stringer 1998, Terry 1999) (Figure 4) and no difference

in change in CD4 count for participants in a combined

aerobic and PRE group compared with the non-exercising control

group (WMD: 21.52 cells/mm3, 95% CI: -29.25, 72.28, n=84,

*P*=0.41) (Rigsby 1992, Grinspoon 2000, Dolan 2006) (Figure 5).

**A-2) CD4 Percentage**

Two meta-analyses were performed for CD4 percentage that included

the same studies. Meta-analyses demonstrated no difference

in change in CD4 percentage for participants in the exercise

intervention group compared with the non-exercising control

group as well as the constant aerobic exercise group compared with

the non-exercising control (WMD: -0.33%, 95%CI: -1.98, 1.32,

n=118, *P*=0.69) (Smith 2001, Baigis 2002)

Perna 1999 found the highest increase in CD4 count of 60 cells/

mm3 in the compliant exercise group and a combined increase of 3

cells/mm3 in the combined compliant and non-compliant exercise

intervention group compared to a decrease of 39 cells/mm3 in the

non-exercising control group. LaPerriere 1990 showed an average

increase of 38 cells/mm3 in the interval exercise group compared

to an average decrease of 61 cells/mm3 in the non-exercising control

group. Lox 1995 found an average increase of 9 cells/mm3

in the exercise group and an average decrease of 78 cells/mm3 in

the non-exercising control group. Baigis 2002 found an average

increase of 13 cells/mm3 in the exercise group compared to an average

decrease of 4 cells/mm3 in the non-exercising control group.

Stringer 1998 found an increase of 13 cells/mm3 in the moderateintensity

exercise group of constant exercise and an average increase

of 5 cells/mm3 in the combined moderate- and heavy-intensity

exercise groups compared to an increase of 18 cells/mm3 in

the non-exercising control group. Smith 2001 found an increase

of 7 cells/mm3 in the exercise group compared to an increase of

32 cells/mm3 in the non-exercising control group. Results from

Stringer 1998 and Smith 2001 were statistically non-significant.

Terry 1999 and MacArther 1993 found no significant changes

in CD4 count. Grinspoon 2000 found an average increase of 31

cells/mm3 in the exercise group compared to an average increase

of 33 cells/mm3 in the non-exercising control group. Rigsby 1992

found an average increase of 58 cells/mm3 in the exercise group

compared to an average decrease of 2 cells/mm3 in the non-exercising

control group. These results were not statistically significant.

Dolan 2006 found a non-significant increase of 8 cells/μL

and 11 cells/μL in the exercise group and non-exercising control

group, respectively. Terry 2006 reported a decrease in CD4 count

in the combined exercise and low lipid diet group of 41 cells/mm3

and an increase in the low lipid diet only group by 48 cells/mm3,

but these changes were not statistically significant. Driscoll 2004

reported non-significantmedian increases inCD4 count of 59 and

42 cells/mm3 in the combined exercise and metformin group and

the metformin only group, respectively. Mutimura 2008a found

that the increase in CD4 count in the exercise group (19 cells/

μL) was not significantly different from that in the non-exercising

control group (34 cells/μL).

**A-3) Viral Load**

Three meta-analyses were performed for viral load, of which two

included the same studies. Meta-analysis demonstrated no difference

in change in viral load for participants in the exercise intervention

group compared with the non-exercising control group

as well as the constant aerobic exercise group compared with the

non-exercising control group (WMD: 0.40 log10copies, 95% CI:

-0.28, 1.07, n=63, *P*=0.25) (Smith 2001; Stringer 1998) Figure

8; Figure 9; and no difference in the combined aerobic and PRE

group compared with the non-exercising control group (WMD:

0.31 log10copies, 95%CI: -0.13, 0.74, n=60, *P*=0.17) (Grinspoon

2000, Dolan 2006)

**Individual Study Results - Viral Load**

Stringer 1998 found an average decrease of 0.65 log10copies in the

combinedmoderate- and heavy-intensity exercise groups versus an

average decrease of 0.30 log10copies in the non-exercising control

group. The largest decrease in viral load was seen in the moderateexercise

group with an average decrease of 0.9 log10copies. Smith

2001 found an average increase of 0.10 log10copies in the exercise

group compared to an average decrease of 0.30 log10copies in the

non-exercising control group. Results from both of these studies

were statistically non-significant. Grinspoon 2000 found no significant

differences in viral load. Dolan 2006 reported a non-significant

increase in viral load of 0.1 copies/μL in the exercise group

and non-significant decrease of -0.2 copies/μL in the non-exercising

control group. Driscoll 2004a reported no change in viral

load in both the combined exercise and metformin group and the

metformin only group. Terry 2006 reported that after the intervention

13 of 15 participants in both the exercise and combined

exercise and low lipid diet groups had viral load values below 80

copies/mL. These results were not significant.

No significant differences

were found in all but one meta-analysis for CD4 count or viral

load outcomes, suggesting that aerobic exercise has little impact

on immunological or virological status.

**MUSCLE WASTING**

O’Brien (2009)

AIDS wasting is a condition associated with HIVinfection and is defined as an “involuntary loss of more than 10% of baseline body weight in combination with diarrhea, weakness or fever.” (CDC 1987). AIDS wasting may lead to increased energy expenditure (Grunfeld 1992), increased energy intake (Macallan 1995), decreased functional capacity (Grinspoon 1999), and even death (Palenicek 1995).

Four of the seven studies included comparison groups that assessed the effects of co-interventions of PRE with testosterone (Sattler 1999, Bhasin 2000 and Grinspoon 2000) and whey protein (Agin 2001). These studies also included comparison groups consisting of testosterone only and whey protein only, respectively. Three of the seven studies assess the effect of testosterone only (Sattler 1999, Grinspoon 2000, Bhasin 2000).

Three of the seven studies included participants with elements of wasting syndrome (either >5%or >10% involuntary weight loss or body weight <90% ideal body weight) (Grinspoon 2000, Agin 2001 & Bhasin 2000). One of the studies included participants with low testosterone levels (serum total testosterone levels less than 12.1nmol/L) (Bhasin 2000). Three of the seven studies included participants who were diagnosed with AIDS wasting at baseline (Bhasin 2000, Grinspoon 2000, &Agin 2001).

Bhasin (2000) reported adverse events such as breast enlargement for a participant receiving testosterone and acne for two participants, one who was receiving testosterone and the other, placebo. Hemoglobin levels also increased among participants in the testosterone groups. Sattler (1999) reported some minor adverse events such as acne and testicular shrinkage for participants in the testosterone groups. No participants developed urinary symptoms, breast enlargement, edema or changes in blood pressure. Spence (1990) and Lox (1995) did not report on any adverse events to assess safety.

**Muscle wasting in HIV (Glover, 2010)**

Moderate resistance exercise can offset pathologically induced wasting. The minimal volume and intensity required to elicit changes is unknown. Neutralizing muscle loss.