

N-acetylcysteine and glycine supplementation in HIV patients rapidly improves Glutathione levels, mitochondrial function, muscle strength, insulin resistance, inflammation, and lowers body fat

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Background

- Mitochondria are tiny engines in every cell of our body, which burn fat and sugar to generate life-giving energy

Mitochondria = Energy = Life

- Mitochondria malfunction in HIV, and are unable to burn (oxidize) fat, and **we do not know why**
- HIV patients are also at high risk of having:
 - *muscle weakness*
 - *more belly fat*
 - *insulin resistance with prediabetes*
 - *inflammation (harmful tissue irritation)*
 - **Could these defects be happening due to mitochondrial malfunction?**
- Mitochondria require plentiful supply of an important antioxidant protein called Glutathione (GSH) to work efficiently, but GSH levels are very low in HIV, and **we do not know why**.

Why We Did this Study

To find out:

- What is the reason for Glutathione deficiency in HIV?
- Is it possible to correct Glutathione deficiency?
- Can mitochondria be improved?
- Is it possible to:
 - increase muscle strength?
 - lower belly fat and belly size?
 - improve insulin resistance (prediabetes)?
 - lower inflammation (harmful tissue irritation)?

What We Did

In 8 HIV infected men, we measured:

- blood levels of Glutathione
- mitochondrial function
- muscle strength
- insulin resistance
- inflammation

What We Found

HIV patients have very low levels of Glutathione

AND

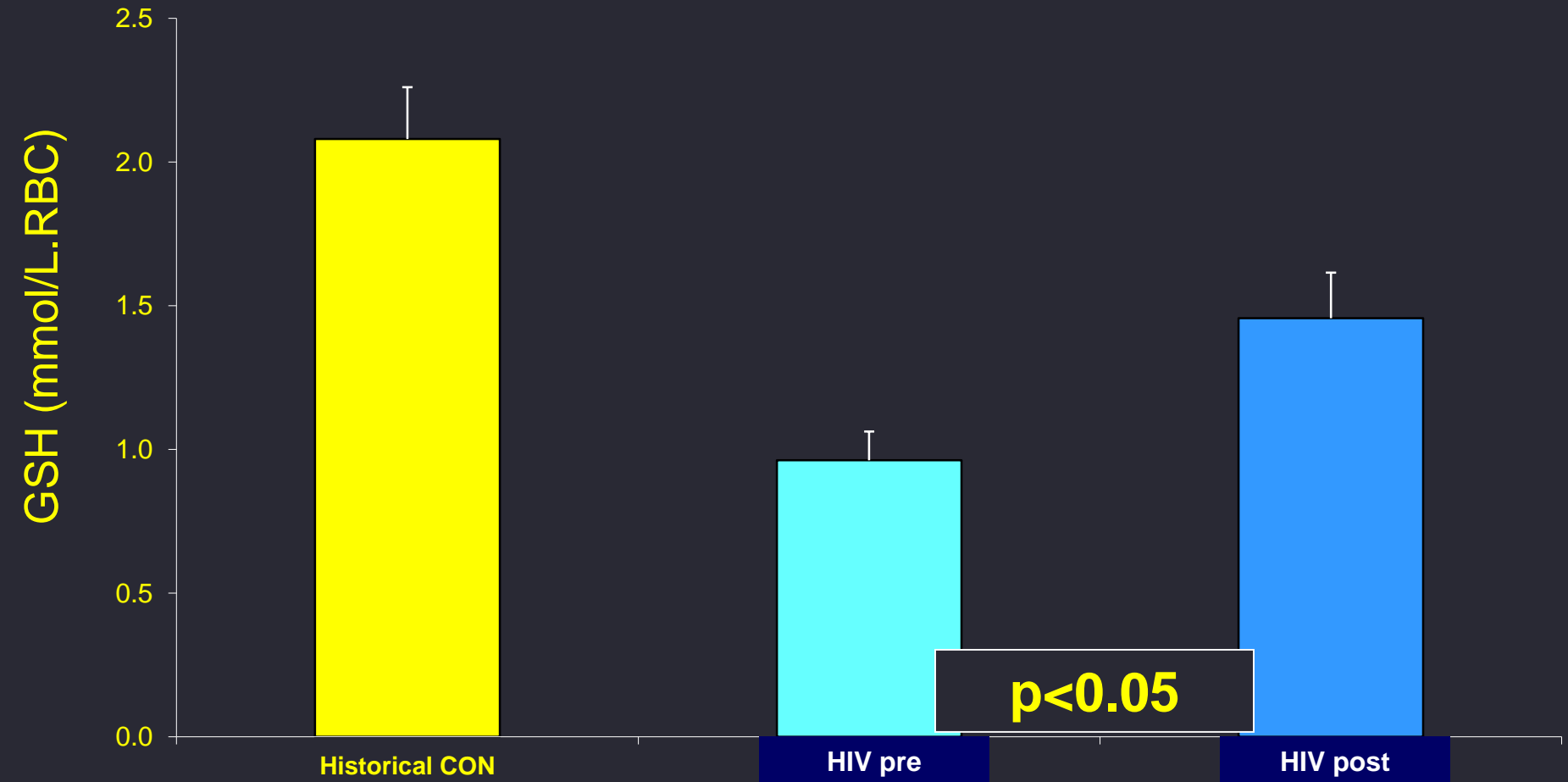
**Very low levels of Glutathione building blocks
cysteine and glycine**

What We Did Next

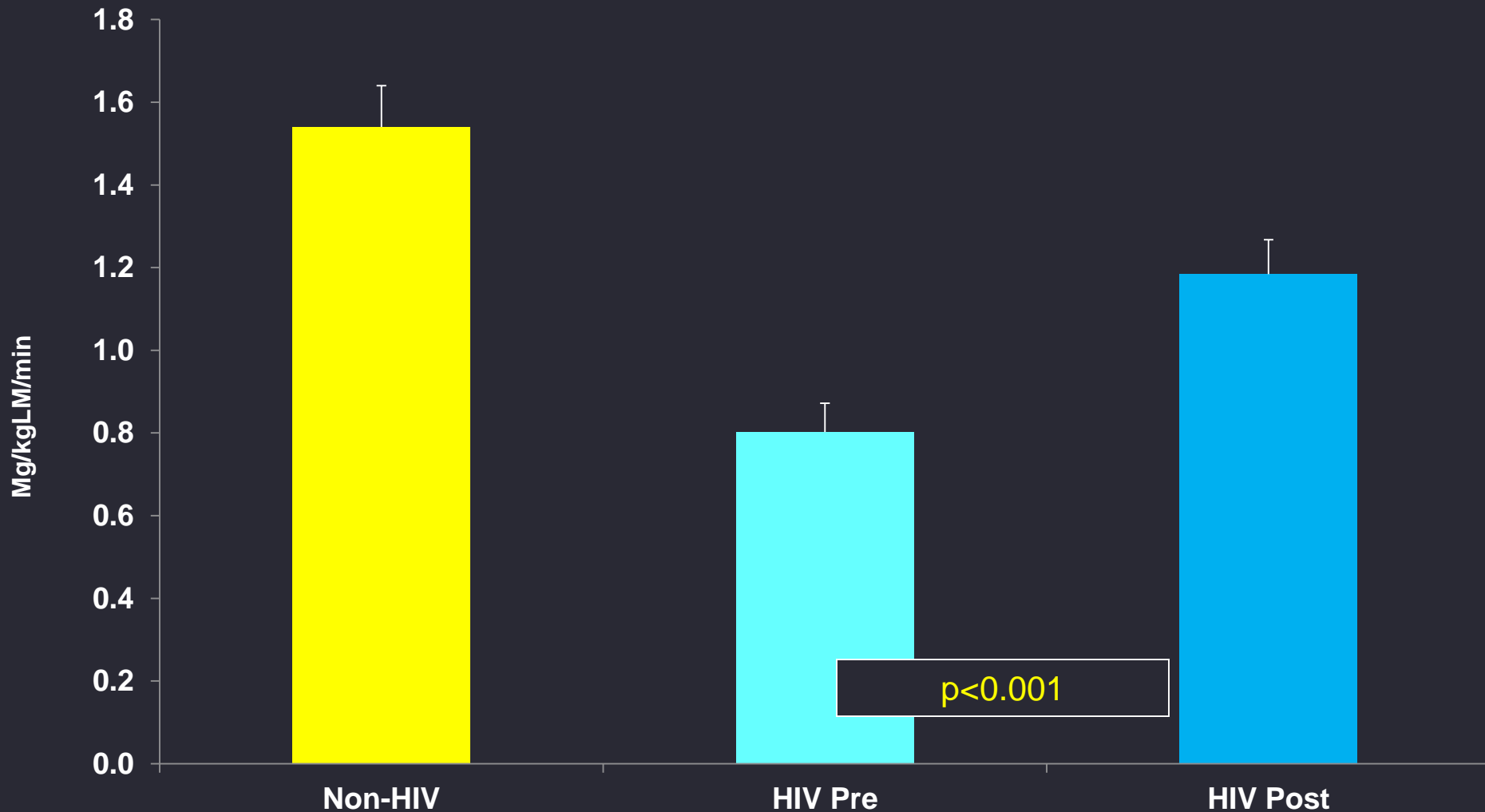
Since cysteine and glycine levels were low, we provided these by mouth to participants for 2-weeks as N-acetylcysteine and Glycine (NAC-Gly)

The effect of NAC-Gly supplementation in HIV

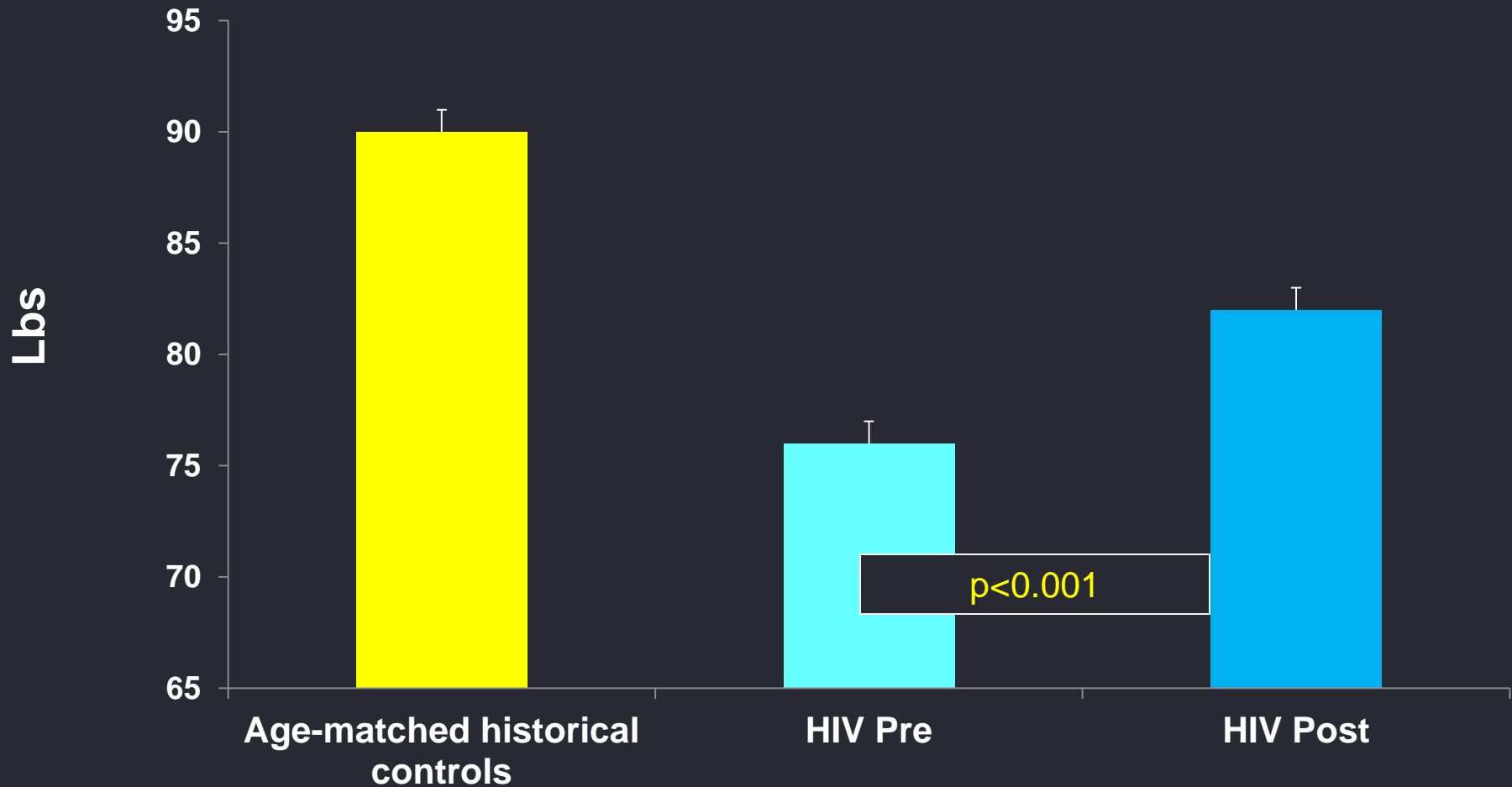
Glutathione levels improve



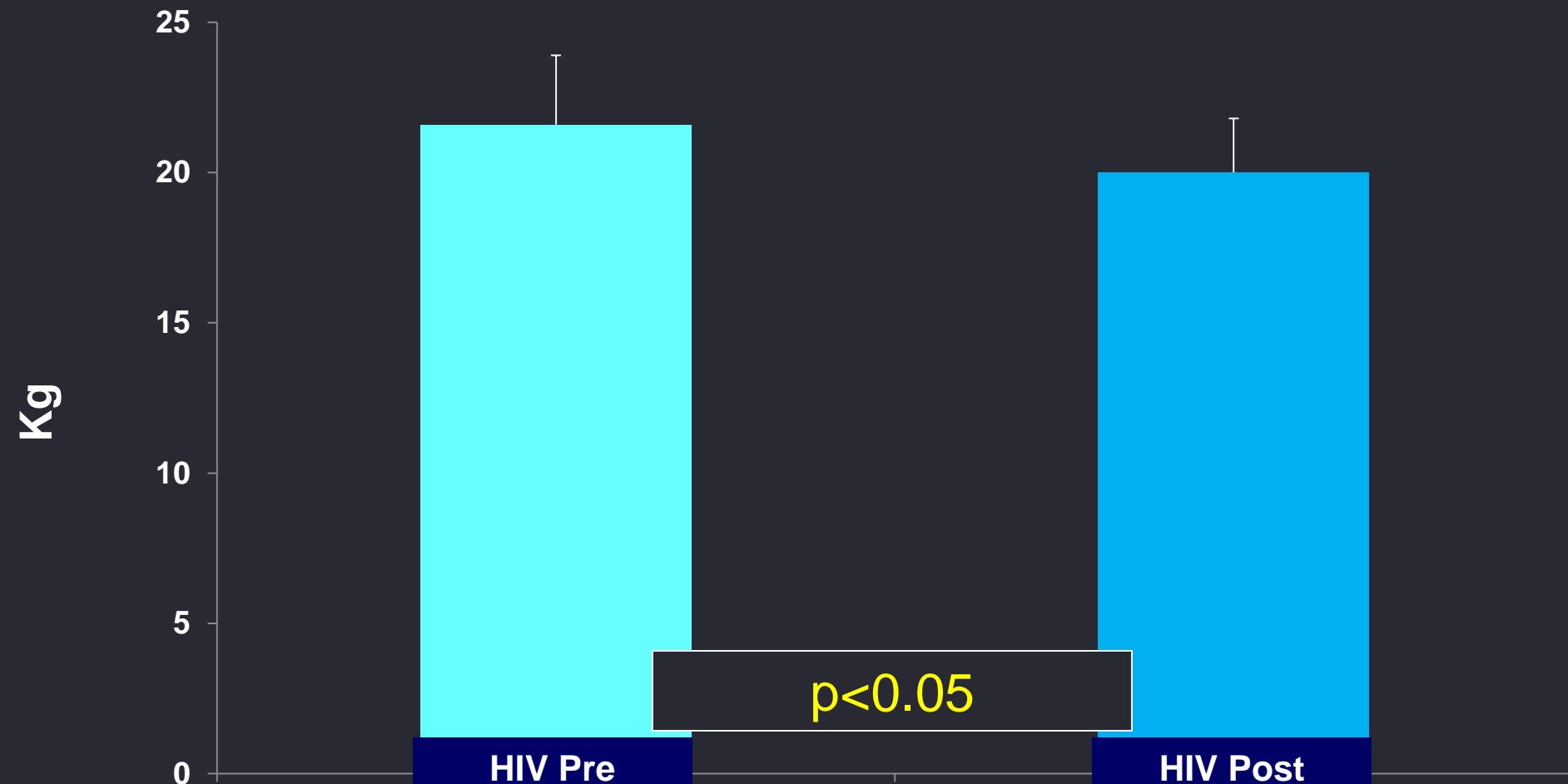
Mitochondrial fat burning capacity improves



Muscle strength improves

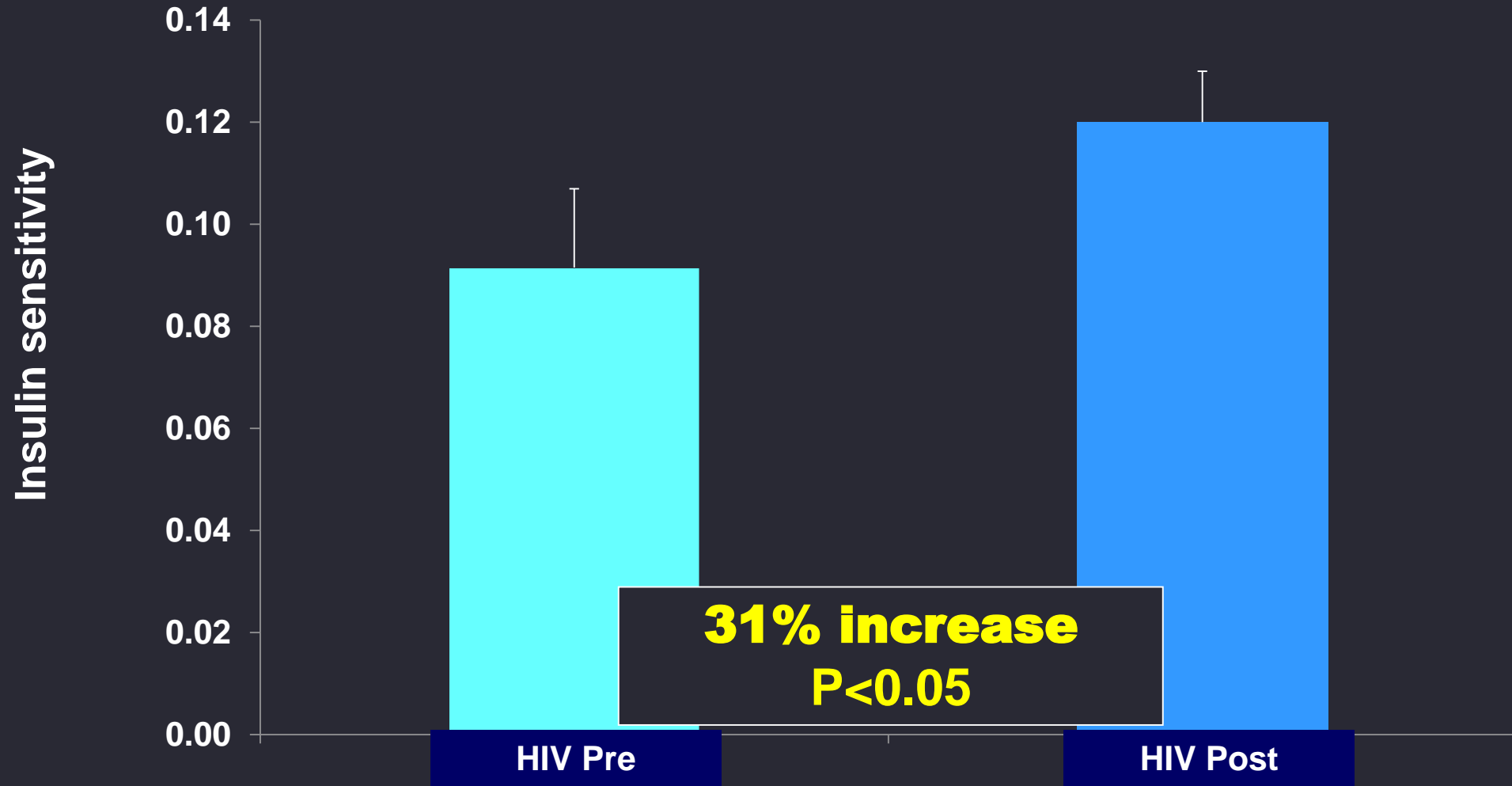


Body weight, body fat and belly size improve

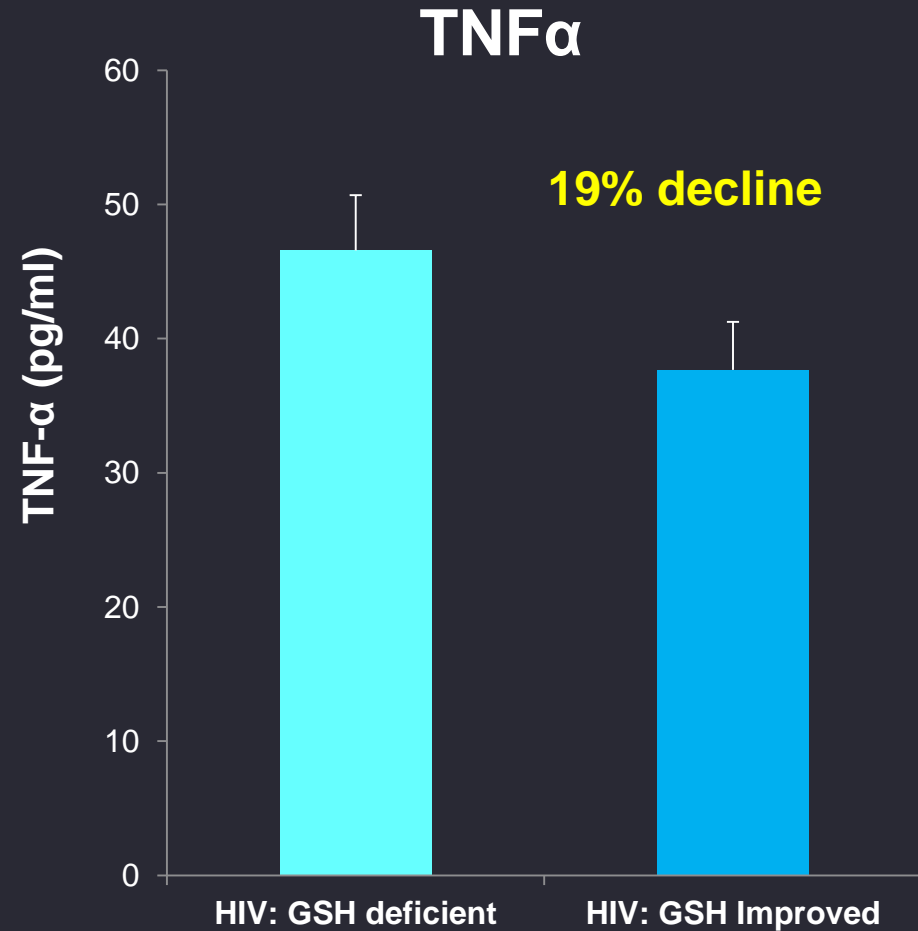
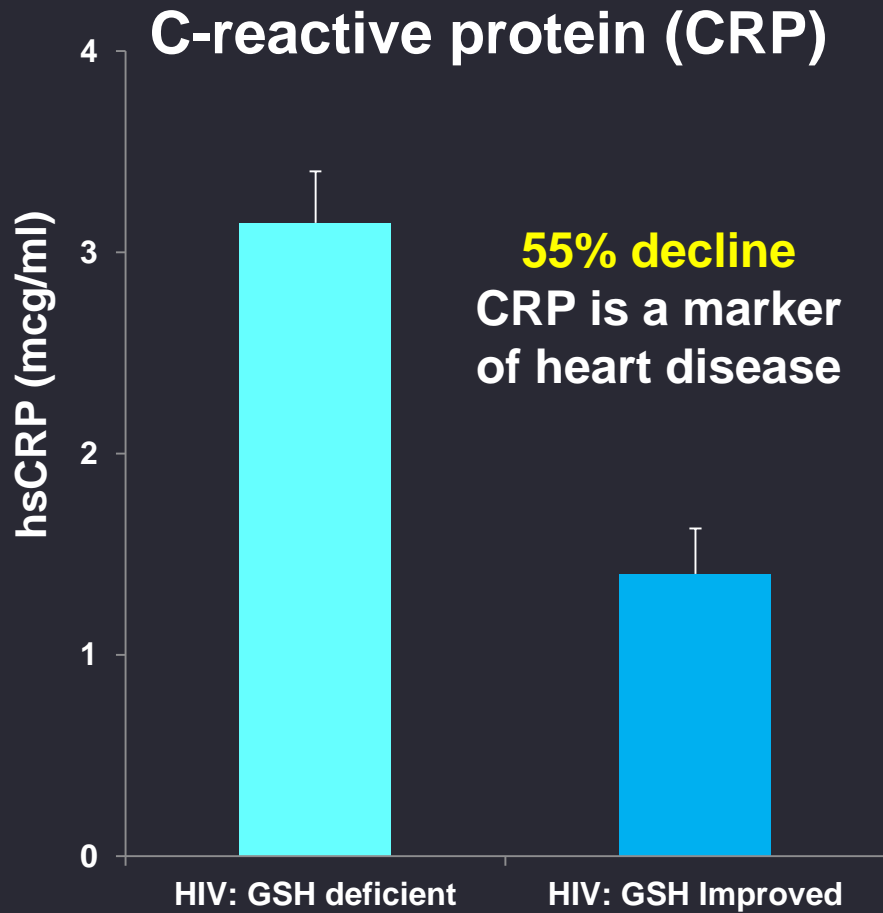


3.5 lb. loss in total body fat and up to 1" decrease in waist circumference

Insulin works better



Harmful inflammation becomes less



What Our Results Mean and Why this Matters

- Although these are results from a pilot study, **this matters** because *mitochondrial decline, muscle weakness, excess belly fat, insulin resistance and inflammation*, are all serious complications of HIV infection. **We do not know why these problems occur, or how to correct them.**
- ***Our results mean that we can now understand why these problems may be occurring, and how to correct them.***
- N-acetylcysteine and glycine supplementation could play a helpful role in improving the health of PLWH.
- We recently completed a second pilot study with a longer 12-weeks of supplementation, which confirms and extends these findings. Collectively, these studies support the needed for a large randomized clinical trial with a placebo group.

Acknowledgments

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