Growth hormone response to Exercise in McArdle's Patients

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Presentation structure

- Lactate
- Human growth hormone (hGH)
- McArdle's
- Aims of Oswestry hGH study
- Oswestry hGH study- what we did.
- Findings of Oswestry hGH study
- Implications
- The future

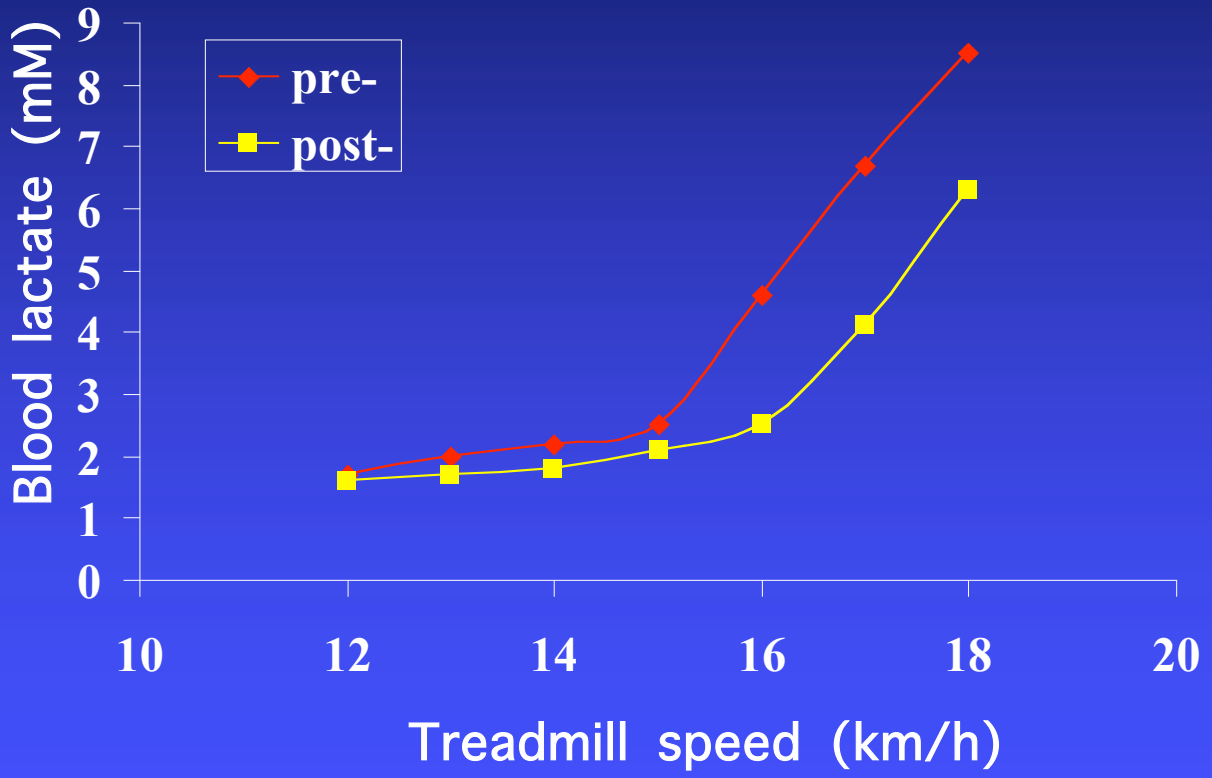
Lactate

- Lactate has been used as a ‘marker’ of relative exercise intensity in athletes and non-athletes.
- Lactate has been suggested as a major stimulus for secretion of hGH in exercise (Sutton et al, 1976).
- A number of studies have shown a high correlation between lactate and hGH (Kozlowski et al, 1983; Chwalbinska-Moneta et al, 1996).
- Many studies show a ubiquitous role for lactate as – fuel substrate, mediator of physiological or biochemical processes or as an inter- or intra-cellular signal (Favero et al, 1997; Akiyoshi, Iwamoto and Nakaya, 1999; u et al 1997; Hunt and Hussein, 1994; Van Hall, 2000).

Blood sampling

Running on a treadmill

Lactate (cont)



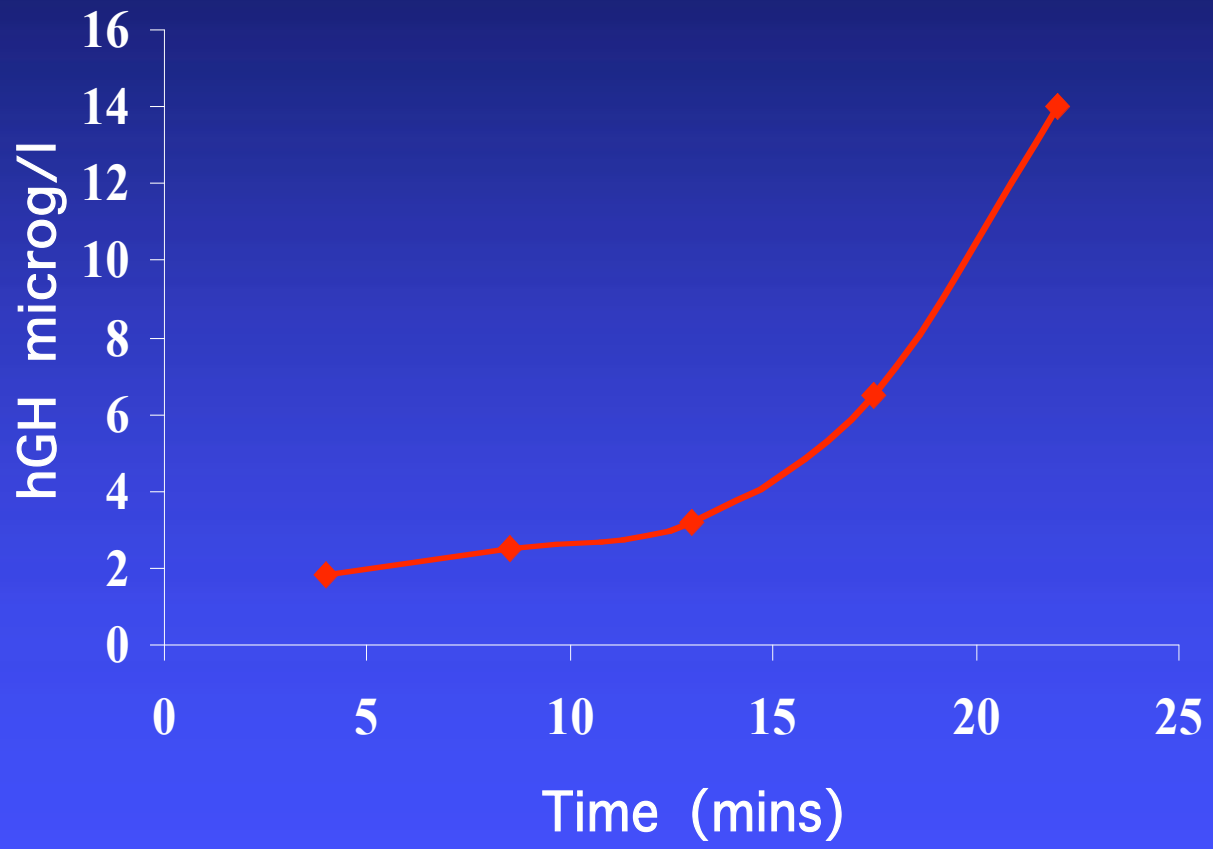
Human Growth hormone

- hGH, generally follows a circadian rhythm.
- is released from the anterior pituitary in 6-12 discreet pulses per day.
- Greatest ‘surge’ seen ~1hr after onset of night-time sleep (~12 midnight).
- Greatest non-pharmacological stimuli for secretion of GH are sleep and exercise.

hGH (cont)

- Most obvious effects- growth from childhood to adulthood. -on puberty.
- Influences turnover of bone, and other tissues, promotes healing.
- Involved in regulation of other hormones, protein synthesis, muscle growth, substrate utilisation, maintenance of low body fat.

Exercise-induced hGH response



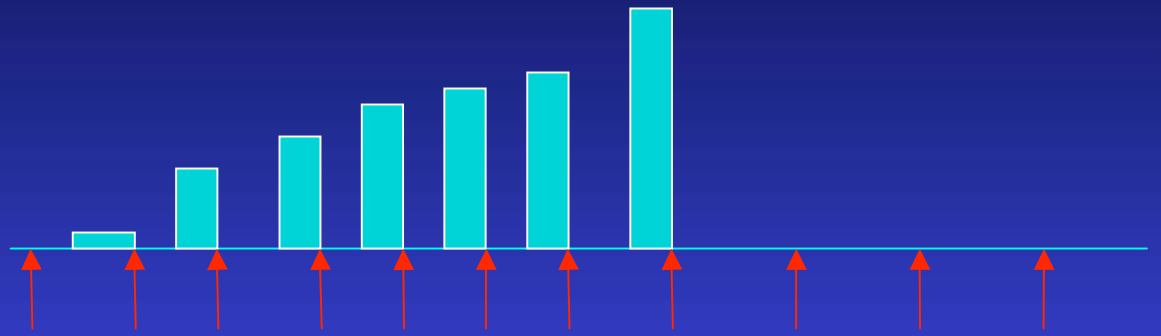
McArdle's Disease

- Gene mutation
- Type V GSD
- Deletion of the enzyme myophorylase.
- Don't produce lactate during exercise.
- Pain on exercise.
- Contracture.

Oswestry hGH study aims

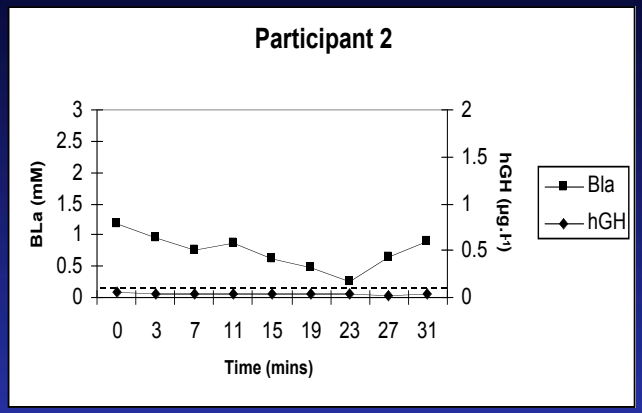
- In the absence of lactate do McArdle's patients produce an EIGR?
- If so, could this be used to identify the optimal intensity of exercise to improve quality of life in these individuals?
- Is lactate the primary stimulus for the EIGR?

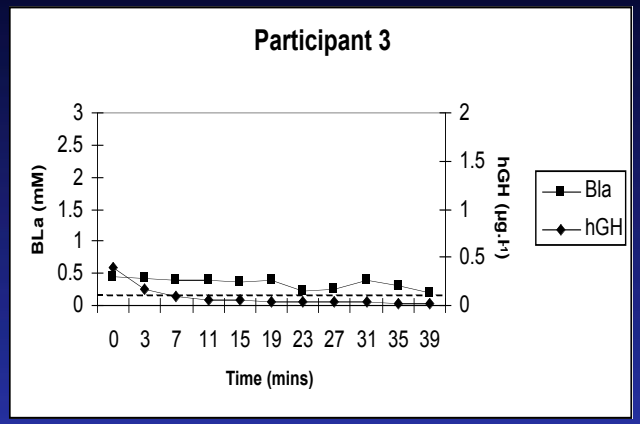
Owestry hGH study- What we did.

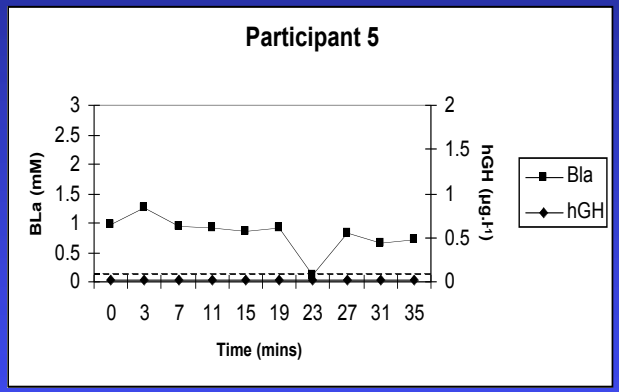


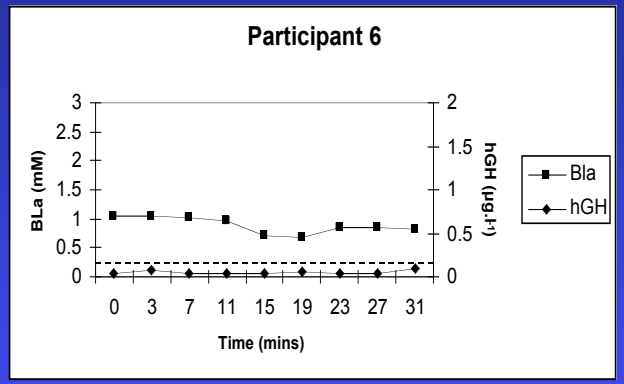
- 11 participants- walking on motorised treadmill.
- Stages of 3 minutes of exercise, starting at 1.5 kph, increasing by 0.5 kph each stage.
- Rest periods of 60 s for blood sampling.
- Exercise until either complete 3 minutes at 6.5 kph or a pain scale (CR10) rating of “4”.

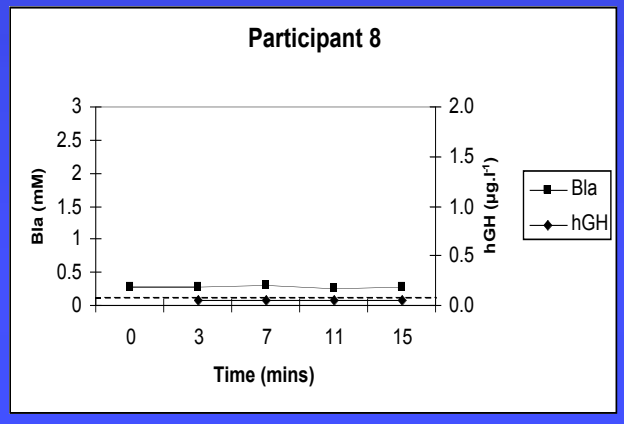
Findings ('N')

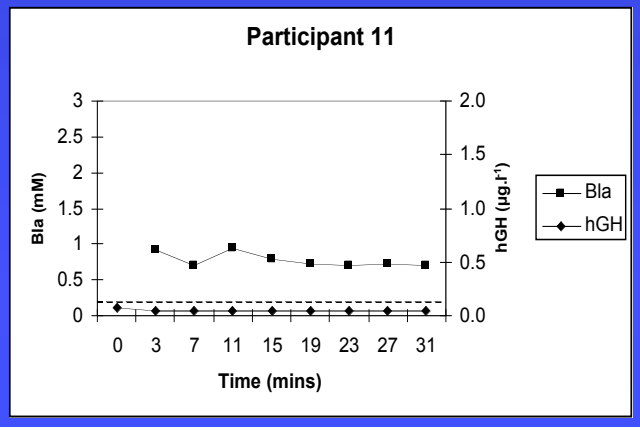

Participant 2
BLa (mM)
hGH (µg.l-1)
Time (mins)
Bla
hGH


Participant 3
BLa (mM)
hGH (µg.l-1)
Time (mins)
Bla
hGH

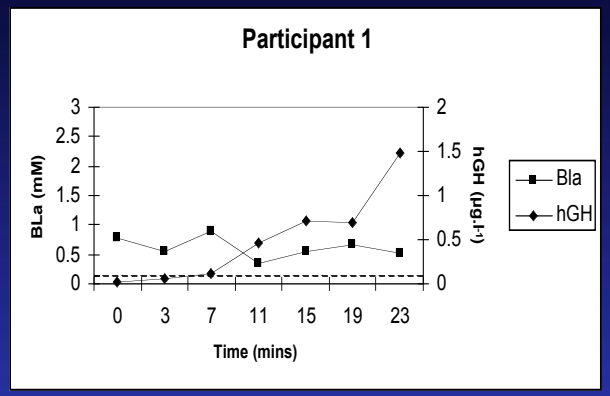

Participant 5
BLa (mM)
hGH (µg.l-1)
Time (mins)
Bla
hGH

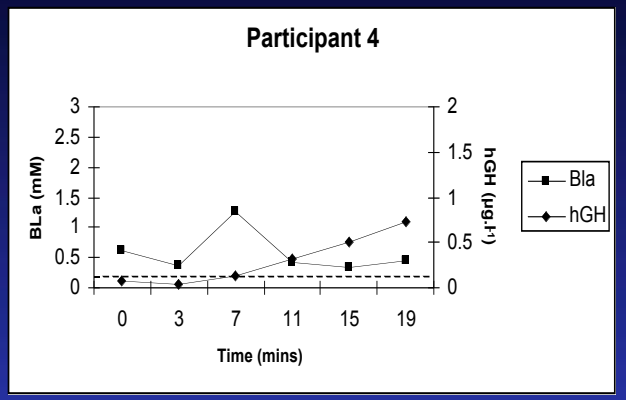

Participant 6
BLa (mM)
hGH (µg.l-1)
Time (mins)
Bla
hGH

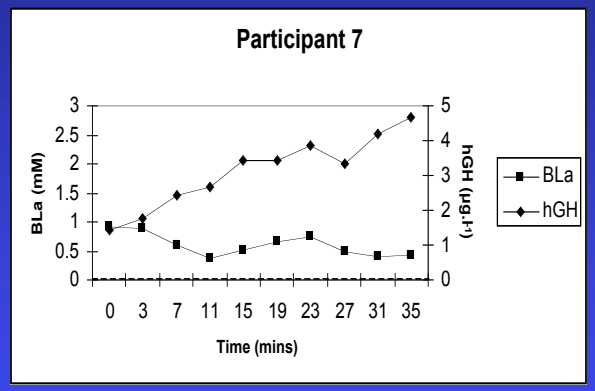

Participant 8
Bla (mM)
hGH (µg.l-1)
Time (mins)
Bla
hGH

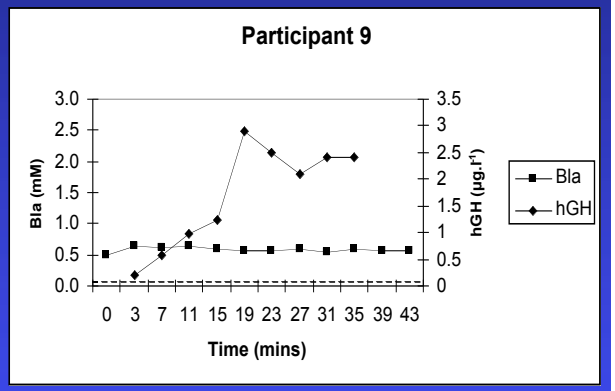

Participant 11
Bla (mM)
hGH (µg.l-1)
Time (mins)
Bla
hGH

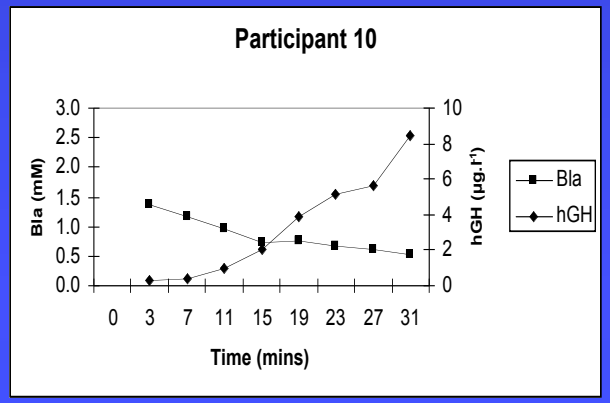
Findings ('R')


Participant 1
BLa (mM)
hGH (µg.l-1)
Bla
hGH
Time (mins)


Participant 4
BLa (mM)
hGH (µg.l-1)
Bla
hGH
Time (mins)


Participant 7
BLa (mM)
hGH (µg.l-1)
BLa
hGH
Time (mins)


Participant 9
Bla (mM)
hGH (µg.l-1)
Bla
hGH
Time (mins)


Participant 10
Bla (mM)
hGH (µg.l-1)
Bla
hGH
Time (mins)

Implications

- On the data collected so far it appears that EIGR profiles cannot be used as a substitute for lactate profiles in McArdle's patients.
- Further research would -
  - help to establish a more reliable data base on patients with the disease and establish how best exercise intervention might be used to help.
  - Confirm whether or not EIGR is a viable option to id optimum exercise intensity for McArdles.

Future research

- Possibilities
  - Repeat hGH & exercise study
  - Add cardiac function study to this.
- Qualitatitve / quantitative approach

Future research (cont)

- Qualitative data collection has been neglected- i.e. data relating to the quality of life of the individual.
- Combined use of qualitative and quantitative data has never been attempted with McArdle's patients.

Aim in adding qualitative data collection.

- To place the patient experience in the context of their disease and consequent lifestyle.
- To evaluate the extent to which the disease disrupts everyday life and the forms of knowledge underpinning their disease.
- To examine and distinguish between coping, strategy and style.
- To examine the consequences of McArdle's on self and identity.

Aim in combining with qualitative data collection (cont).

- To analyse personal narratives, including those of medical and scientific professionals.
- To examine selected aspects of physiological and pathophysiological function.
- To examine some of the aspects of physiological and pathophysiological function to many qualitative measures cited above.

Expected outcome

- It is envisaged that carrying out further research including, and combining, both quantitative and qualitative data collection could be extremely beneficial in improving the quality of care and quality of information- reducing uncertainty, improving confidence and improved lifestyle advice.
- Overall result- an improved quality of life.