2017

Manual of procedures: Effect of habitual diet on fuel utilisation during exercise

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Manual of procedures: Effect of Habitual Diet on Fuel Utilisation during Exercise

Contributed by: Anneliese Reeves¹, Kieron Rooney¹, Dale Hancock¹, Tom Gwinn¹, and Dick Stevenson²

¹University of Sydney, ²Macquarie University

Project: Effect of Habitual Diet on Fuel Utilisation during Exercise
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1 Introduction/Background

This project aims to investigate the interaction between habitual diet and fuel utilisation during exercise. Specifically, whether dietary fat and carbohydrate composition affect the rate of maximal fat oxidation.

This is a cross-sectional study in which the participants visit the laboratory on a one-off occasion. During this visit, they participate in anthropometry measurements (height, weight, hip and waist circumference, body composition), have blood collected to be analysed for health markers (resting glucose, lactate, ketones and a lipid profile) and DNA (CD-36 gene), undergo a variety of nutritional analysis measures to determine their habitual diet and complete a maximal aerobic exercise test on a cycle ergometer to determine fuel partitioning. The population for this study are healthy males (aged 18-54 years) and healthy females (aged 18-64 years), absent of cardiovascular disease, diabetes or cardiovascular disease or diabetes medications, are not pregnant, have no diagnosed mental illnesses and have been weight stable and had a stable diet in the past six months.

2 Key papers / theoretical basis for the method

2.1 Theoretical basis

Multiple studies have investigated fuel utilisation during exercise using a variety of experimental procedures. There are a variety of different exercise testing methods. To minimise laboratory visits to a single visit, we adapted validated protocol by Achten et al. (2002). This protocol allows for fat oxidation to be measured as the stages are three minutes, allowing participants to hit steady state, but is also a ramp protocol to allow for a maximal VO2 measure to be attained. However, for this study the participants, whilst having the same increments of 35W, begins at a lower output as our participants are not all elite athletes. This is one of the many methods used to analyse fuel utilisation during exercise. Other papers do time trials or other endurance tests.

The difficulties with this method occur when testing a wide variety of fitness levels. This test can be very fast for untrained populations as they are unable to reach very high power outputs, resulting in minimal data points. For the highly-trained populations, this test can be quite long.

The equations used to calculate fat and carbohydrate oxidation from gas data are from Frayn (1983). Both these methods are widely accepted for determination of fuel utilisation.

2.2 References


### 3 Ethical considerations

The study was designed to ask participants whether they would allow for their biological tissue to be stored for potential future use (consent from participants would be sought before retesting). Clearance was gained by having a separate Participant Consent Form for the use of future tissues and ensuring access to samples was only for the Sydney University investigators.

As this study was dealing with DNA information, attention was paid by the ethics committee as to how we were keeping data safe. By using participant IDs and ensuring hard copy data was locked and soft copy data was on password protected computers, we were able to ensure this information would stay confidential.

Please see the Participant Information Sheet and Participant Consent Form.

### 4 Scope

This procedure applies to all staff and students working on this project and any employed research and administration assistants.

### 5 Facility and equipment

#### 5.1 Location of laboratory

Testing was conducted at the University of Sydney Faculty of Health Sciences, Cumberland Campus. The testing laboratory/laboratories require:

- Room for cycle ergometer and metabolic cart
- Table for point of care blood collection
- Plinth for BIA analysis
- Sink for dampening heart rate strap and emptying spit catcher if necessary
- Bathroom for urine sample
- Table (or clipboard) for filling out forms
## Equipment

* denotes Standard Facility Supplied Equipment (No purchasing details available)

### 5.1.1 Laboratory-based equipment

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Photo/description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Stadiometer</strong>*</td>
<td>Wall secured stadiometer</td>
</tr>
<tr>
<td><em>Height measuring rod with stand, Wedderburn</em></td>
<td></td>
</tr>
<tr>
<td><strong>Scales</strong>*</td>
<td>Scales measuring to 10g</td>
</tr>
<tr>
<td><em>Wildcat, Mettler Toledo, China</em></td>
<td></td>
</tr>
<tr>
<td><strong>Cycle ergometer</strong>*</td>
<td></td>
</tr>
<tr>
<td><em>Excalibur Sport V 2.0 bicycle, Lode BV, Netherlands</em></td>
<td></td>
</tr>
<tr>
<td><strong>Gas analysis system</strong>*</td>
<td></td>
</tr>
<tr>
<td><em>Parvo Medics, TrueOne 2400 metabolic measurement system</em></td>
<td></td>
</tr>
<tr>
<td><strong>Calibration syringe</strong>*</td>
<td></td>
</tr>
<tr>
<td><em>Hans Rudolph 3L calibration syringe Series 5530</em></td>
<td></td>
</tr>
<tr>
<td><strong>Headpiece, mouthpiece, nose clip and tubing</strong>*</td>
<td></td>
</tr>
<tr>
<td><em>Tubing to fit to the gas analysis system with matching mouthpiece</em></td>
<td></td>
</tr>
</tbody>
</table>
5.1.2 Other equipment and consumables

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Photo/description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measuring tape*</td>
<td>*6mmx2m measuring tape, Lufkin Executive</td>
</tr>
<tr>
<td>Bioelectric Impedance Analysis</td>
<td>*Quantum X Bioelectrical Body Composition Analyzer, RJL Systems, Michigan, USA</td>
</tr>
<tr>
<td></td>
<td><em>(Purchasing details provided in section 11)</em></td>
</tr>
<tr>
<td>Electrodes</td>
<td>*Red Dot Resting EKG Electrodes (2330), 3M Healthcare,</td>
</tr>
<tr>
<td></td>
<td>This item is recognised as a standard laboratory consumable and as such is ordered</td>
</tr>
<tr>
<td></td>
<td>through a Faculty provided service. See section 11 for more details</td>
</tr>
<tr>
<td>Blood pressure monitor (with resting HR)</td>
<td>*“XL” Deluxe Automatic Blood Pressure Monitor (MW701f), Rossmax Swiss GmbH,</td>
</tr>
<tr>
<td></td>
<td>Berneck, Switzerland</td>
</tr>
<tr>
<td></td>
<td><em>(Purchasing details provided in section 11)</em></td>
</tr>
<tr>
<td>Torniquet*</td>
<td>*</td>
</tr>
<tr>
<td><strong>Blood needles</strong></td>
<td></td>
</tr>
<tr>
<td>------------------</td>
<td>---</td>
</tr>
<tr>
<td><em>Vacuette Safety Blood Collection Set and Holder (23G x ¾&quot;)</em>, Grenier Bio One GmbH, Kremsmünster, Austria</td>
<td></td>
</tr>
<tr>
<td><em>(Purchasing details provided in section 11)</em></td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Serum separating tubes</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><em>SST II Advance, Becton, Dickinson and Company, Plymouth, UK</em></td>
<td></td>
</tr>
<tr>
<td><em>(NOTE: these were supplied by the Pathology company coordinating blood analysis within their service costs so no purchasing details available)</em></td>
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</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Band-aids</strong></th>
<th></th>
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</thead>
<tbody>
<tr>
<td><em>Absorbent underpads (‘blueys’)</em></td>
<td></td>
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</table>

<table>
<thead>
<tr>
<th><strong>Lactate monitor and corresponding lactate strips</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Lactate Scout, SensLab GmbH, Leipzig, Germany</em></td>
<td></td>
</tr>
<tr>
<td><em>Lactate Scout test strips, Sens Lab BmbH, Leipzig, Germany</em></td>
<td></td>
</tr>
<tr>
<td><em>(Purchasing details provided in section 11)</em></td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Glucose monitor and corresponding glucose strips</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Freestyle Optium Neo, Abbott, Oxon, UK</em></td>
<td></td>
</tr>
<tr>
<td><em>Freestyle Optium Blood Glucose Test Strips, Abbott, Oxon, UK</em></td>
<td></td>
</tr>
<tr>
<td><em>(Purchasing details provided in section 11)</em></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Ketone monitor and corresponding glucose sensor strips</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Freestyle Optium Neo, Abbott, Oxon, UK</em></td>
<td></td>
</tr>
<tr>
<td><em>Freestyle Optium Blood β-Ketone Test Strips, Abbott, Oxon UK</em></td>
<td></td>
</tr>
<tr>
<td><em>(Purchasing details provided in section 11)</em></td>
<td></td>
</tr>
<tr>
<td><strong>Lipid analyser and corresponding panels</strong></td>
<td><img src="image1.png" alt="Image" /></td>
</tr>
<tr>
<td>------------------------------------------</td>
<td>------------------</td>
</tr>
<tr>
<td><em>Cardiochek PA Test System, Polymer Technology Systems, Inc., Indianapolis, USA</em></td>
<td></td>
</tr>
<tr>
<td><em>PTS Panels Test Strips Lipid Panel Test Strips, Polymer Technology Systems, Inc., Indianapolis, USA</em></td>
<td></td>
</tr>
<tr>
<td>(Purchasing details provided in section 11)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>HbA1c monitor kit</strong></th>
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</tr>
</thead>
<tbody>
<tr>
<td><em>A1CNow+ Multi-test A1C System, Polymer Technology Systems, Inc., Indianapolis, USA</em></td>
<td></td>
</tr>
<tr>
<td>(Purchasing details provided in section 11)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Lancets and lancet device</strong></th>
<th><img src="image3.png" alt="Image" /></th>
</tr>
</thead>
<tbody>
<tr>
<td><em>E-zject, 21 gauge, single-use, 200 units</em></td>
<td></td>
</tr>
<tr>
<td>(Purchasing details provided in section 11)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Gauze swabs</strong></th>
<th><img src="image4.png" alt="Image" /></th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Cotton filled white 5x5cm, Livingstone</em></td>
<td></td>
</tr>
<tr>
<td>(Purchasing details provided in section 11)</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Alcohol swabs</strong></th>
<th><img src="image5.png" alt="Image" /></th>
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<tbody>
<tr>
<td>(Purchasing details provided in section 11)</td>
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</table>

<table>
<thead>
<tr>
<th><strong>Heart rate strap</strong></th>
<th><img src="image6.png" alt="Image" /></th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Polar</em></td>
<td></td>
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</tbody>
</table>

Author: Anneliese Reeves and Kieron Rooney
**5.1.3 Personal Protective Equipment (PPE)**

<table>
<thead>
<tr>
<th>Item</th>
<th>Photo/description</th>
</tr>
</thead>
</table>
| Gloves*           | To be worn when collecting blood  
|                   | For use in the lab when handling biological specimens                             |
| Rubber gloves*    | For use when using bleach for washing                                            |
| Lab coat*         | For use in the lab when handling biological specimens                             |
| Safety glasses*   | For use in the lab when handling biological specimens                             |
| Biohazard bin*    |                                                                                   |
| Sharps bin*       |                                                                                   |
6 Training/qualifications/competencies

Please indicate (check the box) to indicate which of the following is required prior to undertaking this method:

Yes  No

☑  ☐  Health and Safety training
  
  *For the university and for the labs used*

☑  ☐  Laboratory induction

☑  ☐  Current First Aid / CPR

☑  ☐  Immunisation: *Pertussis, varicella, diphtheria, measles, tetanus, mumps, rubella*

☑  ☐  Method-specific training: *lab-specific training for use of the centrifuge and fume hood*

☑  ☐  Formal qualification required: *phlebotomy training*

7 Restricted access

The use of this method is restricted to individuals with a qualification in Phlebotomy, who are vaccinated.

8 Health and safety / Risk Assessment

The lab used is a PC2 lab and has its own health and safety procedures in compliance with PC2 laboratories.
9 Workflow

NOTE: Please see data collection sheets here.

9.1 Written Consent and Risk Stratification

To participate in testing the participant is required to read the Participant Information Statement (PIS), complete the Participant Consent Form (PCF) and an ESSA Pre-exercise Screening.

9.2 Questionnaires

The participant is required to complete four questionnaires;

- Three Factor Eating Questionnaire (Stunkard and Messick 1985)
- Food Craving Index
- Dietary Fat and Sugar Survey (Francis and Stevenson 2013)
- Active Activity Survey (Australian Institute of Health and Welfare 2013)

• 24hr Food Recall
  The 24-hour food recall is to be conducted by an investigator interviewing the participant. Participants are asked to recall all foods and beverages consumed from 12am the previous day to 12am the day of testing. Participants are asked to give as much detail as possible in regards to food types, brands and quantities.

  Work systematically through their day. Check they had no extra drinks or snacks between meals (including chewing gum or food given to them). Serving sizes can be given in terms of volume, weight, hand size or relation to a standard item (eg. Half an apple).

  NOTE: Second 24-hour food recall: a second 24-hour food recall needs to be conducted via phone within the following six weeks of the testing date, without informing the participant of what date it would be.

9.3 Anthropometry, blood pressure and resting heart rate

9.3.1 Height

1. Measure the participant’s height on a stadiometer in triplicate.

2. Ensure the participant has removed their shoes and socks and has flattened hair.
3. Position the participant in the following way; standing upright with their heels, buttocks, scapulae and head touching the stadiometer, heels touching.

4. Measure their height after inhalation, compressing hair when bringing the board or tape measure down.

5. Record the measurement in centimetres (cm) to the nearest millimetre.

9.3.2 Weight

1. Measure the participant’s weight on calibrated electronic scales in triplicate.

2. Ensure the participant removes shoes, socks and excess clothing.

3. Check the scales are set to zero and ask the participant to stand in the centre of the scales.

4. Record the measurement in kilograms (kg).

9.3.3 Waist circumference

1. Waist circumference measurements were conducted in accordance with the following protocol: [http://apps.who.int/iris/bitstream/10665/44583/1/9789241501491_eng.pdf](http://apps.who.int/iris/bitstream/10665/44583/1/9789241501491_eng.pdf)

2. Measure the participant’s waist circumference using a tape measure.

3. Ensure the participant is standing with feet together and arms crossed over chest.

4. Locate the lowest rib and iliac crest on one side of the body and mark these landmarks with a pen mark.

5. Measure the distance between the two landmarks, calculate and mark the halfway point.

6. Place the measuring tape around the waist at the midpoint between the iliac crest and lower rib.

7. Ensure the tape is held snug against the participant’s skin, but is not cutting in, measuring at minimal respiration (after exhalation).

8. Record the measurement in centimetres (cm).

9.3.4 Hip

1. Measure the participant’s hip circumference using a tape measure in triplicate.

2. Ensure the participant is standing with feet together and arms crossed over the chest.

3. Wrap the tape measure around the hips (the maximum extension of the buttocks) and ensure the tape is horizontal and held snugly against the participant.

4. Record the measurement in centimetres (cm).
9.3.5 Bioelectric Impedance Analysis

1. Tetrapolar Measurement: Calculate the participant’s body composition using a tetrapolar bioelectric impedance analysis machine.

2. The participant needs to remove any jewellery/metal items and roll up long pants and long sleeve shirts.

3. The participant then needs to lie down on a bed facing upwards, with legs, arms and fingers not touching and palms facing downwards for five minutes before data collection.

4. Gently clean the electrode sites with an alcohol wipe.

5. Place electrodes with tabs facing away from the body on the following four unilateral sites; proximal metatarsal of the third phalange, middle of the wrist, centre of the talus, the base of the third metacarpal.

6. Attach the detector electrode leads onto the wrist and ankle electrodes.

7. Attach the black detector electrode leads onto the metatarsal and metacarpal.

8. The participant must remain still as you turn on the analyser and wait for measurements to stabilize.

9. Record displayed resistance (R) and reactance (Xc). Measure in triplicate.

9.3.6 Blood pressure and resting heart rate

1. Measure the participant’s blood pressure using an automatic blood pressure cuff (Rossmax monitoring) immediately after the BIA.

2. Wrap the blood pressure cuff around the participant’s left upper arm with the sphygmometer cord lining up with the brachial artery.

3. Ensure any clothing is taken up or rolled up above this point.

4. Inflate the cuff and record systolic and diastolic measurements as systolic/diastolic in millimeters mercury (mmHg) and resting heart rate (beats per minute).

9.4 Biological tissue collection

9.4.1 Venous blood samples

1. Collect two 5mL blood samples using serum separating tubes (SST) using a butterfly needle (Safety Blood Collection Set + Holder, 23G x 3/4”, Tube length: 7.5”, Vacuette Grenier bio-one) from the antecubital area.

2. Invert tubes upon collection and allow to clot for 30-60 minutes.
9.4.2 Urine samples

1. The patient also needs to provide a urine sample for which can be collected at any
time before the exercise testing. The urine sample will be primarily used for
assessment of glucose and fructose content as funds become available for biomarker
validation of food recall data.

9.4.3 Point of care blood testing

1. Blood lipids (HDL, LDL, triglycerides, total cholesterol), resting blood ketones, resting
blood glucose, resting blood lactate and HbA2c will be measured with a CardioChek
P.A, Abbott FreeStyle Optium Neo, LactateScout and A1CNow+ Multi-Test System
respectively with their corresponding test strips.

2. All blood work is to be done wearing gloves and over a blood mat. All disposable blood
sampling devices are to be disposed of in the biohazard bin and the sharps in the
sharps bin.

3. Secure the lancet into the lancet device, remove the safety cap of the lancet and
replace the cap of the lancet device and turn to the highest setting (5/5).

4. Wipe the desired finger with an alcohol swab and dry with gauze.

5. Turn on the devices and ensure correct blood sample setting.

6. Hold the lancet against the participant’s finger and press down on the eject button to
prick the side of the finger tip, ensuring the finger is pointing downwards to help the
formation of a blood droplet, after giving the participant warning.

7. Wipe away the first blood droplet with gauze and proceed to fill the various test strips.

8. Give the participant gauze to hold down on their finger to stop the bleeding once
blood collection has been completed. More than one finger may be required to obtain
enough blood.

9. Record the results.

9.5 Exercise testing

9.5.1 Equipment setup

1. Turn on the pneumotach and allow to warm-up for 40 minutes before conducting a
flow meter calibration using a 3L Hans-Rudolph valve and a gas calibration using a
cylinder of standardised gas as per the instructions of the Parvo.

2. Set the computer program to a progressive ramp protocol of 35 Watts every three
minutes.
3. Ensure it is possible to switch to manual control to progress to two minute stages if needed.
4. Connect the computer to the magnetically braked cycle ergometer and connect the heart rate receiver to the computer if possible.

9.5.2 Participant setup
1. Dampen the receiver of the heart rate monitor and ask the participant to put it on.
2. Adjust the height of the bike seat so that at the downward part of the pedal stroke, the participant’s leg is not quite fully extended and adjust the handlebars to the participant’s preferred position.

9.5.3 Exercise test
1. The exercise test will consist of three minute stages at the participants’ self-selected cadence.
2. Beginning at 35 watts, increase by 35 watts every three minutes.
3. In the final minute of each stage, perform a blood collection by swabbing a finger with an alcohol swab, wiping it with gauze and collecting a blood lactate, glucose and ketone sample as above.
4. If the participant’s RER exceeds 1.00 for the duration of the final minute of a stage, change to two minute stages and cease blood collection.
5. The exercise test is stopped when a participant fails to maintain the set power output for >20 seconds or with termination of exercise.
6. The participant then cools down on a self-selected power output for five minutes or until feeling rested.

9.6 Analysis of biological samples

9.6.1 Venous blood
1. After allowing to clot for between 30 and 60 minutes, spin one of the 5mL SST blood samples in a centrifuge at 2000 rcf, 4°C for 15 minutes.
2. Collect 0.5mL plasma for storage.
3. Aliquot the rest of the serum to be sent off to a commercial pathology lab to test for insulin, HDL, LDL, triglycerides and total cholesterol.
4. Store the plasma in -80°C freezers. Store the whole blood in a -80°C freezer for DNA analysis.
9.6.2 Urine

1. Aliquot 1.5mL of urine into an Eppendorf tube.
2. Store in a -80°C freezer for urine fructose and sucrose analysis.

9.7 Cleaning and equipment maintenance

9.7.1 Mouthpiece

1. Take the mouthpiece apart and rinse with water.
2. Dispense in a solution of 100mL hospital grade disinfectant and 1900mL water.
3. Allow to soak for 40 minutes.
4. Take parts out of the solution and allow the parts to air dry.

9.7.2 Tubing

1. Dispense some of the solution into the tubing.
2. Rinse with solution and then rinse with water. Air dry.

9.7.3 Headpiece

1. Rinse the material head protector.
2. Wipe down the headpiece.

10 Data handling and management

Record results on the data sheet and the hard copy questionnaires. At the end of each data session, scan in the results and store on a password protected computer, backed up on a hard drive which resides in a locked draw.

The exercise test data is automatically recorded on the Parvo computer program. Rename the files to include the participant ID and transfer to a computer. This data is to be transferred to the analysis template.

Transfer the exercise data onto the individual analysis spreadsheet and follow the instructions on the spreadsheet to analyse the exercise test data. Transfer all other results onto the spreadsheet.

10.1 FoodWorks

Analyse both 24-hour food recalls in Foodworks 8 Software (Xyris Software). From this, macronutrient ratios and estimated daily caloric consumption is given.
10.2 Using the Individual Data Sheet

The Participant Data Analysis Sheet is made up of four sheets:

1. **VO₂ test** – analysis of the VO₂ test
2. **Questionnaires** – analysis of the dietary and activity questionnaires
3. **Other** – all other data; bloods, anthropometry, 24-hour food recall analyses etc
4. **VO₂ data** – copy of the complete data set from the gas analysis program

### 10.2.1 Sheet 1: Analysis of VO₂ test

#### 10.2.1.1 Fat and carbohydrate oxidation

The Parvo calculates expired oxygen (VO₂) and expired carbon dioxide (VCO₂) as 15 second averages. These values are able to be used to calculate fat and carbohydrate oxidation using the following equations (these equations are built into the spreadsheet):

- **Fat oxidation:** \(1.67 \times \text{VO}_2 - 1.67 \times \text{VCO}_2\)
- **Carbohydrate oxidation:** \(4.55 \times \text{VCO}_2 - 3.21 \times \text{VO}_2\)

(Frayn, 1983)

The fat oxidation and carbohydrate oxidation is averaged for the last minute of each stage. The highest calculated rate for fat oxidation throughout the entire test is recorded as the MFO with the intensity at which this occurred is recorded as the FATMAX value

### Analysing the data

<table>
<thead>
<tr>
<th>Input exercise test data</th>
<th>There are three sections of the data (shown below) into corresponding locations on Sheet 1 For the exercise test data, ensure the last minute of each exercise stage is in the yellow rows (will have to separate data for the two minute stages)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adjust the max VO₂</td>
<td>In cell AD6, change the one minute average to the four highest VO₂ points (Column C) without a decline in power output at the end of the test</td>
</tr>
<tr>
<td>Adjust carbohydrate and fat oxidation values</td>
<td>Change carbohydrate (Column W) and fat oxidation (Column Y) values which are less than zero to zero</td>
</tr>
<tr>
<td>Enter lactate, glucose and ketone data</td>
<td>Enter into corresponding rows for lactate (Column E), glucose (Column F) and ketone (Column G)</td>
</tr>
<tr>
<td>Adjust the graphing table</td>
<td>Delete all data points where RER is greater than 1 and #DIV/0!</td>
</tr>
</tbody>
</table>
Calculate crossover
Delete all data points apart from the two points around the crossover
Input the m and b value of a slope equation from one of the lines(y=mx+b) to calculate the crossover

Maximal Fat Oxidation
Find the corresponding VO₂ for the MFO and enter into cell AB13

Figure 1 and 2: The spreadsheet used for calculations. Coloured circles reflect the different sections for different parts of data, corresponding to the below table.

<table>
<thead>
<tr>
<th>Average results</th>
<th>Auto fills from input data used to create the graphs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Graphs</td>
<td>Automatically created from table of average values</td>
</tr>
<tr>
<td>Results summary</td>
<td>Main results</td>
</tr>
<tr>
<td>Instructions</td>
<td>Summary of what to do for exercise test analysis</td>
</tr>
<tr>
<td>Crossover calculation</td>
<td>Calculating the crossover point</td>
</tr>
<tr>
<td>Exercise test data</td>
<td>Data from the test</td>
</tr>
</tbody>
</table>
10.2.2 Sheet 2: Questionnaire data scoring

**Three Factor Eating Questionnaire**
- Part 1: For ‘True’ answers, put a ‘T’ and for false answers put a ‘F’ in Column C
- Part 2: For the scales, assign values 1-4 working left to right across the page and put the numerical value into Column C

**Food Craving Index**
- Assign the columns on the questionnaire values 1-5 working left to right and put the numerical value into Column C

**Dietary Fat and Sugar Survey**
- Assign the columns on the questionnaire values 1-5 working left to right and put the numerical value into Column C

**Active Australia Survey**
- Part 1: Input times for each corresponding category
- Part 2: Assign the scales on the questionnaire values 1-5 working across the page and put the numerical values into Column B

10.2.3 Sheet 3: Other data

- Input all the other data into Sheet 3
- Averages are automatically calculated and body composition calculated from equations mentioned above
### 11 Supplier and ordering information

<table>
<thead>
<tr>
<th>Item description</th>
<th>Product code</th>
<th>Supplier</th>
<th>Notes</th>
</tr>
</thead>
</table>
| Bioelectrical Impedance Analyser | QX           | **Company name:** RJL Systems  
  **Name of contact:** NA (Purchased online)  
  **Contact details:** RJL Systems, Inc.  
  33939 Harper Ave,  
  Clinton Township, MI 48035  
  **email:** info@rjlsystems.com  
  **Web:** [www.rjlsystems.com](http://www.rjlsystems.com)  
  **Phone:** 1.800.528.4513 | While the included details in section 5 are for a QX machine that was used for this study, the equipment was purchased many years ago. In 2015 I purchased a new Quantum machine for another study and as such have used the 2015 details of ordering here. I have checked on March 23, 2017 and the QX model used for this study is still available for purchase.  
  The manufacturer recommends use of the RJL electrodes. However standard practice in our Department is to purchase electrodes from 3M Red dot. (see image in section 5.1.2). The 3M red dot electrodes are recognised as a standard laboratory consumable and as such ordering and supply is managed by a central store. Ordering information would not be useful for anyone outside of the university of Sydney. Suffice to say that they are most likely purchased here: [https://www.medshop.com.au/products/3m-red-dot-ecg-electrodes?gclid=CL26_dSY69ICFdAEKgod8UUEzg](https://www.medshop.com.au/products/3m-red-dot-ecg-electrodes?gclid=CL26_dSY69ICFdAEKgod8UUEzg) |
| Automated Blood                  | MW701F       | **Company name:** Point of Care Diagnostics | |

**Author:** Anneliese Reeves and Kieron Rooney
<table>
<thead>
<tr>
<th>Equipment</th>
<th>Name of contact:</th>
<th>Contact details:</th>
<th>Company name:</th>
<th>Contact details:</th>
<th>Email:</th>
<th>Web:</th>
<th>Phone:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freestyle Optium Neo Analyser</td>
<td>71364.80</td>
<td>NA</td>
<td>Abbott Australasia</td>
<td>NA</td>
<td><a href="mailto:melissa.lee@abbott.com.au">melissa.lee@abbott.com.au</a></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test Name</td>
<td>Company name</td>
<td>Name of contact</td>
<td>Contact details</td>
<td>Web</td>
<td>Phone</td>
<td></td>
<td></td>
</tr>
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<td></td>
<td></td>
</tr>
<tr>
<td>Freestyle Optium Neo Glucose and Ketone Strips</td>
<td>Abbott Australasia</td>
<td>Melissa Lee</td>
<td>NA</td>
<td><a href="http://www.aus.abbott/contact.html">http://www.aus.abbott/contact.html</a></td>
<td>+61-2-9857-1101</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HbA1c</td>
<td>Point of Care Diagnostics</td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Product</td>
<td>Code/Order Number</td>
<td>Location</td>
<td>Company Name</td>
<td>Notes</td>
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<td></td>
</tr>
</tbody>
</table>
| Analyser         | 20 TEST PACK      | Name of contact: Peter Merrilees  
Contact details: 14/76 Reserve Road, Artarmon, NSW 2064  
email: pmerrilees@pocd.com.au  
Phone: 1800 640 075 | [http://www.pocdscientific.com.au/index.php](http://www.pocdscientific.com.au/index.php) | This product is recognised as a standard laboratory consumable and as such ordering and supply is managed by a central store utilising an online database “Science Warehouse”. Ordering information would not be useful for anyone outside of the University of Sydney. |
| Gauze Swabs | GSC075 | **Company name:** Livingstone International | This product is recognised as a standard laboratory consumable and as such ordering and supply is managed by a central store utilising an online database “Science Warehouse”. Ordering information would not be useful for anyone outside of the University of Sydney. |
12 Appendices