URINALYSIS
David B. Fankhauser, PhD
1 April 2010, 14 May 10, 12 May 11

EQUIPMENT
- All vitamin C titration equipment
- 400 mL plastic graduated beakers
- Graduated cylinders (100, 500, 1L)
- Hydrometer and cylinder

SUPPLIES
- 12 oz plastic cups
- Urine collection data sheets
- Multistix 10 SG (for Urinalysis)
- Color printouts of Multistix chart

1. Begin to fill in the data on the accompanying Urine Collection and Vitamin C Data Sheet.
2. Drink a MINIMUM of 12 fluid ounces of water, save the cup! Void bladder, Record the time.
3. After exactly one hour, collect ALL urine you have produced in that hour, record the time.
4. Pour urine into a graduated cylinder large enough to hold it all. Record total volume in mL.
5. Place a urine hydrometer gently into its cylinder, fill with urine until the hydrometer floats.
6. Read the hydrometer (a challenge…) and record (specific gravity = between 1.001 and 1.035)
7. Pour urine back into the collection vessel, rinse the hydrometer and cylinder.
8. Dip a urinalysis strip into your urine to immerse all pads, remove, begin timing the exposure.
9. At specified times, read against the Multistix chart and record all results in table below.
10. Set up vitamin C titration apparatus as directed in previous protocols (see below).
11. Titrate the vitamin C in each flask, calculate the mg Vit C excreted per hour.
12. Clean up all glassware, dispose of urine down sink with cold water.
13. Enter all your urine collection and vitamin C data into the computer.

<table>
<thead>
<tr>
<th>Urinalysis (Multistix 10 SG) results:</th>
<th>normal reading/dL</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>time to read</td>
<td>parameter</td>
<td>reading</td>
</tr>
<tr>
<td>1. beginning</td>
<td>Specific Gravity</td>
<td>varies</td>
</tr>
<tr>
<td>2. 30 sec</td>
<td>Glucose</td>
<td>&lt;30 mg</td>
</tr>
<tr>
<td>3. 30 sec</td>
<td>Bilirubin</td>
<td>&lt;5 mg</td>
</tr>
<tr>
<td>4. 40 sec</td>
<td>Ketone</td>
<td>&lt;5 mg</td>
</tr>
<tr>
<td>5. 45 sec</td>
<td>Specific Gravity</td>
<td>1.001 - 1.035</td>
</tr>
<tr>
<td>6. 1 minute</td>
<td>Blood</td>
<td>&lt;0.01 mg</td>
</tr>
<tr>
<td>7. 1 minute</td>
<td>pH</td>
<td>4.6 - 8.0</td>
</tr>
<tr>
<td>8. 1 minute</td>
<td>Protein</td>
<td>&lt;15 mg</td>
</tr>
<tr>
<td>9. 1 minute</td>
<td>Urobilinogen</td>
<td>&lt;10 WBC</td>
</tr>
<tr>
<td>10. 1 minute</td>
<td>Nitrite</td>
<td>&lt;0.06 mg</td>
</tr>
<tr>
<td>11. 2 minutes</td>
<td>Leukocytes</td>
<td>&lt;10 WBC</td>
</tr>
</tbody>
</table>

DETERMINATION OF HOURLY RATE OF VITAMIN C EXCRETION

David B. Fankhauser, PhD
11 May 1993, rsvd 27 Mar 94, 29 Mar 95, 24 Mar 96, 25 Nov 01, 2 May 02, 26 Mar 03, 7 May 03, 12 May 04, 1 Apr 10, 14 May 10
http://biology.clc.uc.edu/fankhauser/Labs/Anatomy_&_Physiology/A&P203/Titrations/Vitamin_C_Excretion.html

EQUIPMENT: All as listed in titration protocol plus 400 mL beakers and grad cylinders: 100, 500, 1000 mL 10 mL pipets and bulbs (or 5 mL displacement pipets and tips)
1. Completely void the bladder at the beginning of the Lab, note the time of voiding to the minute.
2. Consume at least 12 full ounces of water (or a non-caffeinated drink). THIS IS IMPORTANT!
3. Exactly one hour later, collect and measure all urine produced by completely voiding into a 400 mL beaker (more for some…). Record the total volume produced, save about 50 mL.
4. Measure the specific gravity of your urine using the hydrometer. Note that it should be between 1.000 and 1.040. (Make an illustration of the hydrometer which shows your reading on the scale.)
5. Titrate 10 mL aliquots of the urine in 10 mL Rxn Mix in triplicate, carefully recording start and finish volumes for each, as previous described in the titration protocol.
6. Determine the average mL iodine required per 10 mL of urine.
7. Determine the amount of vitamin C in the 10 mL aliquot: multiply mL iodine times the CF.
8. Determine the number of aliquots produced per hour by dividing the total volume of urine produced in an hour by the aliquot size (10 mL).
9. Determine the total vitamin C excreted per hour by multiplying the number of aliquots in the hour’s sample by the Vitamin C per aliquot.

The whole equation:
\[
\text{mean mL iodine} \times \text{Conversion Factor (mgVitC mL iodine)} = \frac{\text{total mL urine/hour}}{\text{10 mL urine aliquot}} = \text{mg Vit C excreted/hour}
\]