

**Fall 2002 Genomics Exam #1
Genomic Medicine and Sequencing Tools**

There is no time limit on this test, though I have tried to design one that you should be able to complete within 3 hours, except for typing and web searches. There are three pages for this test, including this cover sheet. You are not allowed discuss the test with anyone until all exams are turned in at 11:30 am on Friday September 27. **EXAMS ARE DUE AT CLASS TIME ON FRIDAY SEPTEMBER 27.** You may use a calculator, a ruler, your notes, the book and the internet. I have to say, this is a challenging test, so do NOT put it off too long. You may take it in as many blocks of time as you need to.

The **answers to the questions must be typed on a separate sheet of paper** unless the question specifically says to write the answer in the space provided. If you do not write your answers in the appropriate location, I may not find them. You may want to capture screen images as a part of your answers which you may do without seeking permission since your test answers will not be in the public domain. If you are asked to print out any pages, you do not have to print in color, though it is permitted.

-3 pts if you do not follow this direction.

Please do not write or type your name on any page other than this cover page.

Staple all your pages (INCLUDING THE TEST PAGES) together when finished with the exam.

Name (please print):

Write out the full pledge and sign:

How long did this exam take you to complete (excluding typing)?

20 points

1) ATGAACAAGAAACAAAATTTTTACGCAGCCATTATTGTGGCTATTTTTCTTTGTTTGCAA
TTGTCTCATGGCTCTTCAGGTGTCAGCTTTGAAAAAACCCCTGCTATTAATAATTGTAGGA
AACAAATTCTTTGACTCTGAGAGTGGGGAACAGTTCTTCATCAAGGGCATTGCTTACCAA
TTGCAGAGAAGTGAAGAGGAGCTTAGCAATGCAAATGGGGCTTTTGAGACAAGTTATATT
GATGCCTTAGCGGACCCAAAAATATGCTTAAGAGATATTCATTTTTGAAAATGCTAGGA
GTGAACACACTGCGTGTATTATGCAATAGATCCGACAAAATCACATGATATATGTATGGAA
GCTCTATCTGCCGAAGGAATGTACGTCTATTAGATCTTTCAGAGCCTGATATTTCAATA
AATAGAGAAAATCCATCTTGGGATGTACATATTTTTGAAAGGTACAAAATCTGTAATTGAT
GCAATGTCATCCTTTCCAAATTTGTTGGGTATTTTGCAGGGAATGAAGTGACAAAATGAC
CATACAAATACCTTTGCATCACCCCTTCGTGAAGGCCCAATCCGAGATGCCAAGGAGTAT
ATTTTCGATTCTAATCATAGAAAAATCCCTGTCGGCTATTCAACTAATGACGATGCTATG

Tell me as much as you can about the sequence above. Use as many sites as you want to fill me in on all the scoop. However, to receive maximum points, be sure and tell me every web site/database you visit and what you found there, even if you found nothing. Sometimes that is important information too.

I encourage you to take screen shots of any graphics you find helpful. Copy and paste these into your Word file.

Do not report any information about DNA microarrays for this gene. That will be on the next test.

20 points

2) This question is a simple one but the answer will take you a while to find. Locate an October 2002 publication by Steen, Lien, Madsen and Birkeland. From this starting point, I want you to show me a picture (screen shot) of which two amino acids are being discussed within the 3D structure from the *E. coli* ortholog. Furthermore, I want you to tell me what type of secondary structure these two amino acids help form in the *E. coli* enzyme. You should paste your screen shot/s into your Word file.

In order to get full credit for this rather challenging question, you **must** print out one page from each intermediate step in the process. I do not want every web site your browser displays; print only the pages that represent major steps in the process you undertook to accomplish this goal.

20 points

3)
CGCTCCGCTGCCTAAGGGCCCCTCGCCACCGCCACCATGGACGCCATCAAGAAGAAGATGCAGATGCTGA
AGCTCGACAAAGAGAAGCCCTTGGATCGAGCTGAGCAAAGCGGAGGCTGATAAGAAGCGGGCGGAAGACCG
GAGCAAGCAGCTGGAAGATGAGCTGGTGTCACTGCAAAAAGAACTCAAGGGCACTGAAGATGAACTGGAC

Tell me everything you can about this sequence. Use as many sites as you want to fill me in on all the scoop. However, to receive maximum points, be sure and tell me every web site/database you visit and what you found there, even if you found nothing. Sometimes that is important information too.

I encourage you to take screen shots of any graphics you find helpful. Copy and paste these into your Word file.

Do not report any information about DNA microarrays for this gene. That will be on the next test.

10 points

4) Summarize the main genomic information behind the disease malignant hyperthermia.

15 points

5) a) Tell me if the human gene sonic hedgehog is well conserved in fish and mouse.

Support your answer with a printout.

b) What is the cytogenetic position of the human sonic hedgehog gene?

c) What is the cytogenetic position of the mouse sonic hedgehog ortholog?

d) How many nucleotides are in the human EST for this gene? Support your data with a printout of the EST sequence.

e) What are the primer sequences and PCR product length for the mouse STS that marks sonic hedgehog?

15 points

6) Download the May 9, 2000 *PNAS (Proceedings of the National Academy of Sciences, USA)* publication: Vol. 97 (10): 5334-5339. Do not use the library copy.

You only need to read the abstract and figure 5 to answer this question, though you are allowed read other parts of the paper if you want. Print the page with figure 5 and do your work on this page. Be sure to turn in your marked up page as a part of your answer.

How many base changes have occurred between the □DNA Rep Prot (#103) and the □, □, □IHV DNA pol (#51)?