

BIOLOGY 141: HUMAN PHYSIOLOGY**Homework Questions*****THE EMPEROR OF ALL MALADIES***

Siddhartha Mukherjee

Instructions

(Note: this class is intended for those going into allied health care professions. Biology 120 (General Biology) is a pre-requisite, and English 110 and Math 90 are recommended preparation classes)

- I. General Instructions: Your assignment this semester will be to read the book, “Emperor of all Maladies” by Siddhartha Mukherjee. This book has been adopted by Grossmont College as an interdisciplinary reading assignment for this school year. You will be given a section of the book to read during weeks 3-15 of the semester, (7 assignments, total of 70 points) and a set of questions corresponding to the chapter. You will answer the questions thoroughly and submit the answers as your weekly homework assignment.

- II. Grading: Your weekly grade will be based upon:
 - A. Correctly answering questions posed.

 - B. Your presentation: including following directions, use of complete sentences, appropriate spelling and appropriate grammar. **Do not use quotations.**

Note: Your homework must be turned in through Blackboard. Blackboard utilizes the SafeAssign feature, which assures that work turned in is original, and not copied from another source.

Instructions: Read the chapters assigned for the week and answer the questions using complete sentences. You may need to refer to outside research for some of your answers. Each assignment is worth 10 points, and will be turned in at the end of weeks 3, 5, 7, 9, 11, 13 & 15.

WEEK 3:**PROLOGUE:**

1. What type of cancer is leukemia? What are the different kinds of leukemia? How does the prognosis of each differ?

PART I: "Of blacke cholor, without boyling""A Suppuration of Blood" p. 11

2. In 1945, Bennett concluded that his patient's leukemia was due to "spontaneous suppuration of blood." How did this erroneous conclusion lead to a wrong treatment? Discuss at least two other examples in medicine in which assumptions misdirected treatment for a long time?
3. The author argues that bone marrow is an organ. Does blood itself meet the criteria of an organ?

"A Monster More Insatiable than the Guillotine" p. 21

4. In the 20th century how were the incidence of typhoid and tuberculosis reduced?

"Farber's Gauntlet" p. 32

5. Discuss the role of folates in human physiology, and how Farber used this knowledge to create cancer-fighting drugs. Why do Farber's trials mark a turning point in the history of cancer research?

"A Private Plague" p. 37

6. How do osteosarcomas form, and why is this disease important in the study of ancient forms of cancer? Why are osteosarcomas rare in ancient skeletal remains?

"Onkos" p. 46

7. What are the language roots of the words "oncology" and "cancer?" Why do these words aptly describe the condition?

"Vanishing Humors" p. 51

8. Who was Veselius, and what contribution did he make to the study of the human body?

"Remote Sympathy" p. 55

9. What specific improvements were made in surgical techniques in 19th century Western medicine? Include a description of the surgeries named after Theodor Billroth.
10. Give a brief history of surgical anesthesia. What are the most common anesthetic agents in use today?

WEEK 5“A Radical Idea” p. 60

1. What was Halsted’s “radical idea” for the treatment of cancer?

“The Hard Tube and the Weak Light” p. 73

2. Discuss the development of Xrays as a means to treat cancer. Why was this discovery a double-edged sword?
3. What “deep principle” with regard to cancer is discussed in this chapter? In addition to curing cancer, radiation also causes secondary cancers. What kinds of cancer are most likely to be caused by medical radiation? What is the likelihood of such an occurrence?

“Dyeing and Dying” p. 80

4. What important contribution did the dye industry make toward the improvement of medical diagnosis in the 19th century? What were some of the organisms and diseases that were identified by this process?

“Poisoning the Atmosphere” p. 89

5. Paracelsus wrote, “Every drug is a poison in disguise.” What did he mean by this statement? Give at least two examples.

“The Goodness of Show Business” p. 93

6. Discuss the meaning of the statement, “A disease needs to be transformed politically before it can be transformed scientifically.”

“The House that Jimmy Built” p. 101 — No questions.**PART II: “An Impatient War”**“They Form a Society” p. 107

7. How did Mary Lasker borrow from the worlds of business, advertising and even the military to build a nationwide effort to combat cancer? How might Lasker’s vision be invoked today to generate funding and national attention for breast or ovarian cancer?

“These New Friends of Chemotherapy” p. 116

8. What is “Wilm’s tumor? What is the treatment and the prognosis? At the cellular level, how do antibiotics treat cancers such as Wilm’s tumor?

“The Butcher Shop” p. 128

- 9./10. How did Zubrod’s approach to research facilitate and hasten the development of cancer treatment strategies? How did this pave the way for

the use of multiple drugs used in the treatment of cancer? What was the negative effect of multiple drug treatment?

WEEK 7

“An Early Victory” p. 135

1. What “deep and fundamental principle” about cancer treatment did Li establish?

“Mice and Men” p. 139

2. How does the drug, Vincristine” exert its effect on cancer at the cellular level?

“Vamp” p. 143

3. At the cellular level, why did patient’s treated for bone marrow leukemia go into remission only to have the leukemia reappear in the brain?

“An Anatomist’s Tumor” p. 151

4. Why was Kaplan successful in his treatment of lymphoma, whereas Halsted (pp. 60-72) was not? What important principle did Kaplan establish?

“An Army on the March” p. 162

5. How did MOPP therapy differ from VAMP therapy in its side effects? Include a discussion of the double-edged sword.
6. How did Pinkel address the problem of penetration of the blood-brain barrier for treatment of leukemia?

“The Cart and the Horse” p. 171

No questions.

“A Moon Shot for Cancer” p. 180

No questions.

PART III: “Will you turn me out if I can’t get better?” p. 191

“In God we trust. All others [must] have data” p. 193

7. What is the centrifugal theory of cancer metastasis? How was the centrifugal theory of cancer debunked?
8. How did debunking this theory affect the thinking and therefore the treatment of breast cancer patients?
9. Why was it difficult to prove this new way of thinking with regard to treating breast cancer?

10. The text states that, “The radical mastectomy is rarely, if ever, performed by surgeons today.” (201) In the face of this statement, what do you think prompted Angelina Jolie to undergo a double radical mastectomy?

WEEK 9

“The Smiling Oncologist” p. 202

1. What is cisplatin, and how does it work at the molecular level to combat testicular cancer? (see also p. 406)
2. Doctors are often focused on the efficacy of treatments in reducing the cancer and are less concerned about the debilitating side effects of the treatments. What are the treatments for the side effects of chemotherapy? Of radiation therapy? What is the role of medical marijuana and what evidence supports its use?
3. What are the laws in California pertaining to medical marijuana?

“Knowing the Enemy” p. 210

4. What is unique about prostate cancer and breast cancer that allowed researchers to develop new, non-toxic methods of treating them?
5. Why were some forms of breast-cancer non-responsive to this form of therapy?

“Halsted’s Ashes” p. 218

6. Define and describe the development of adjuvant chemotherapy. 2. Why was it difficult to introduce adjuvant chemotherapy into cancer treatment in America and how was this resolved?
7. What is palliative medicine and how has it affected the treatment of cancer? Why were doctors initially opposed to palliative medicine in the treatment of cancer?

“Counting Cancer” p. 227

8. If prevention is the only sure-fire way to reduce mortality for a disease, why was so little attention paid to cancer prevention up through the 1980s?

PART IV: “Prevention is the Cure” p. 235

“Coffins of Black” p. 237

9. This section on prevention begins with an illustration of the incidence in British chimney sweeps of scrotal cancer—caused by soot. Chimney sweeping was the first identified carcinogenic occupation. What occupations are considered carcinogenic today?
10. Page 239 states, “Remove the carcinogen—and cancer would stop appearing.” After the public was made aware of the fact, Britain enacted strict

laws that regulated the occupation. When the correlation between cigarette smoking and cancer in American was made public, however, many years passed before the consumption of cigarettes decreased. Besides big money from the tobacco industry, what are some other reasons that this occurred?

WEEK 11

“The Emperor’s Nylon Stockings” p. 243-No questions.

“A Thief in the Night” p. 250

1. How did tobacco companies sow doubt into the scientific research that had been performed on the correlation between smoking and cancer?

“A Statement of Warning” p. 258

2. Oscar Auerbach’s paper of the etiology of lung cancer was of landmark proportions in understanding the disease. Briefly describe the physiological and anatomical progress of lung cancer from the pre-cancerous stage through metastasis. About how long is the progress from tobacco exposure to lung cancer?

“Curiouser and Curiouser” p. 276

3. When does a substance function as both a mutagen and a carcinogen? Be sure to define both words and give examples from this chapter.
4. In the late 1960s why would it have been incorrect to state that Hepatitis B virus directly causes cancer? How was this position reversed after further research?
5. What was so unique about the discovery of the cause of gastritis, ulcers and stomach cancer discovered in 1984?

“A Spider’s Web” p. 286

6. Discuss the sequence of logic and events that lead to the development of the Pap smear and mammogram.
7. How have Pap smear recommendations changed in the last 50 years? How effective are Pap smears for detecting early cancer or pre-cancerous cells? How effective is mammography?

“Stamp” p. 305

8. What is a bone marrow transplant, what are the two types, and what are the positive and negative effects on a person with cancer?

9. On page 316, Mukherjee argues that "the trajectories of AIDS and cancer were destined to crisscross and intersect at many levels." Do you agree with Mukherjee's comparison? Why or why not?
10. Larry Kramer, of ACT UP stated that cure for the AIDS epidemic was thwarted by "genocide by neglect" He went on further to state that "Double-blind studies were not created with terminal illnesses in mind." What does he mean by these two statements? Do you agree with his assessment? Why or why not?

WEEK 13

H. "The Map and the Parachute" p. 321

1. Nelene Fox was denied coverage for bone marrow transplant because her insurance carrier had deemed the procedure "experimental" or "investigational" even though many cancer clinics throughout the country were successfully using it. How did Nelene Fox's case affect insurance coverage for cancer treatment following her death?
2. Why is it important to recognize that cancer is a variety of diseases?

PART V: "A Distorted Version of Our Normal Selves" p. 335

"A Unitary Cause" p. 337

3. What are chromosomes and how do they differ from genes and DNA?

"Under the Lamps of Viruses" p. 349

4. What is different about the virus that causes the common cold or flu and the Rous sarcoma virus, and how did Temin's discovery about the mechanics of the Rous sarcoma virus change the central dogma of thinking with regard to DNA transcription?

"The Hunting of the Sarc" p. 357

5. What are kinases and why was the discovery of kinases important in developing a theory for a common cause of cancer?

"The Wind in the Trees" p. 364

6. Discuss genetic translocation and its relationship to cancer. What is a chimera in this context?
7. Discuss the research that allowed Alfred Knudson to discover the role of anti-oncogenes in carcinogenesis. Be sure to discuss how both oncogenes and anti-oncogenes function in this regard.

“A Risky Prediction” p. 370

8. In 1979, a cell line derived from Earl Jensen, a long-term smoker who died of bladder cancer, was obtained from Dana-Farber Cancer Institute to be used for research. Do patients such as Earl Jensen have any rights to determine what their cells are used for?
9. Briefly describe the origin and history of HeLa cells in research.

“The Hallmarks of Cancer” p. 384

10. Briefly describe the current thinking as to the progression of normal cells to cancer cells. What are the steps involved? How do these behaviors mirror normal human growth?

WEEK 15**PART VI: “The Fruits of Long Endeavors” p. 393**“No One Had Labored in Vain” p. 395

1. What is the current use of the umbilical cord in research? How might this research be expanded?

“New Drugs for Old Cancers” p. 405

2. Summarize the three basic chemotherapy strategies discussed in this chapter, and how each uniquely keeps cancer from growing rapidly. Use this knowledge to explain why patients who undergo chemotherapy frequently suffer from hair loss.
3. How does acute promyelocytic leukemia exert its negative effect on the body? At the cellular level, discuss how trans-retinoic acid interferes with the growth of acute promyelocytic leukemia.

“A City of Strings” p. 412

4. What is recombinant DNA technology? What are some medical conditions and treatments that benefitted from this technology? Did the development of this technology help to develop cancer drugs more efficiently?
5. Barbara Bradfield declined further chemotherapy and enrolled in an alternative herbal therapy program. Your patient asks you about alternative cancer treatments. What are the most common ones? How can their legitimacy and efficacy be determined? How would you advise your patient?

“Drugs, Bodies, and Proof” p. 423

6. “Scientific uncertainty is no excuse for inaction....We cannot wait for ‘proof.’” Read the story of Mari Nelson, and address two reasons why one might agree with this statement, and two reasons why one might disagree with this statement.

“A Four-Minute Mile” p. 430

No questions.

“The Red Queen’s Race” p. 441

7. Why is cancer in this chapter referred to as “The Red Queen’s Syndrome?”

“Thirteen Mountains” p. 448

8. “Cancer is really a pathway disease.” (454) Discuss in physiological terms what the author meant by this statement. Be sure to include a description of “passenger” and “driver” mutations in your answer.

PART VI “Atossa’s War”

9. Re-read pp. 39-45, then read pp. 463-465. Give a brief history as to the therapies developed for cancer therapy from ancient times until the present. How might future cancer therapies look different than the therapies of the last 3500 years?
10. Read the story of Germaine Berne (pp. 467-470) then consider this statement from p. 465: “The War on Cancer may best be ‘won’ by redefining victory.” Do you agree or disagree? Why?