SNC2D BIOLOGY

TISSUES, ORGANS & SYSTEMS OF …

- Comparing Cancer Cells & Normal Cells (P.36)

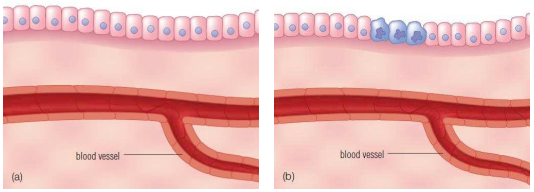
Comparing Cancer Cells & Normal Cells

The main difficulty in detecting cancer is that the appearance of symptoms depends on how fast the cancer cells are dividing. The rate of cancer growth is measured in doubling times. One doubling time is the length of time it takes for the cancer cells to double in number. Doubling times for different types of cancer cells vary from 10 days to several years. The average doubling time for a cancer cell is four months.

Comparing Cancer Cells & Normal Cells

PRACTICE

1. Identify which diagram below represents cancerous cells. How can you tell?



Comparing Cancer Cells & Normal Cells

HOW ABOUT NOW?

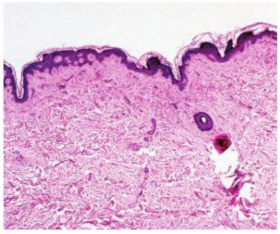


Figure 1 Sample of healthy skin cells

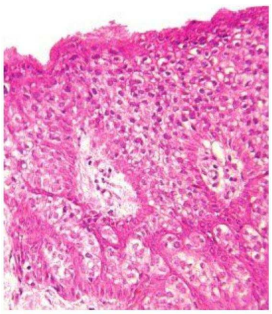
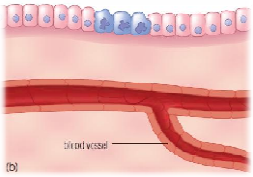


Figure 2 Sample of cancerous skin cells

Comparing Cancer Cells & Normal Cells

PRACTICE

2. It takes about 30 doubling times for a cancer cell to form a tumour that is large enough to be felt through the skin with hands. Calculate (i) how many months and (ii) how many cancer cells it would take to form a tumour that could be felt if the doubling rate is two months.



Comparing Cancer Cells & Normal Cells

How many months and cells to form a tumour that can be felt?

Doubling Time	Months	# Cancer Cells
0	0	1
1	2	2
2	4	4
3	6	8
…	…	…
30	60 (5 years)	1,073,741,824

HOLY **!!**

Activity: Comparing Cancer Cells & Normal Cells

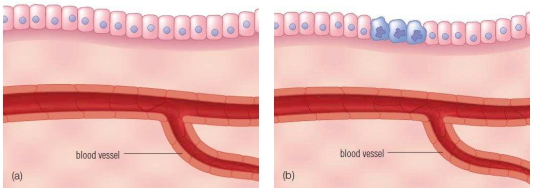
INTRODUCTION

The main difficulty in detecting cancer is that the appearance of symptoms depends on how fast the cancer cells are dividing. The rate of cancer growth is measured in doubling times. One doubling time is the length of time it takes for the cancer cells to double in number. Doubling times for different types of cancer cells vary from 10 days to several years. The average doubling time for a cancer cell is four months.

Activity: Comparing Cancer Cells & Normal Cells

INSTRUCTIONS

A. Identify which diagram below represents cancerous cells. How can you tell?



Activity: Comparing Cancer Cells & Normal Cells

HOW ABOUT NOW?

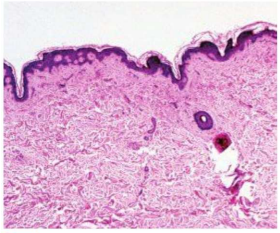


Figure 1 Sample of healthy skin cells

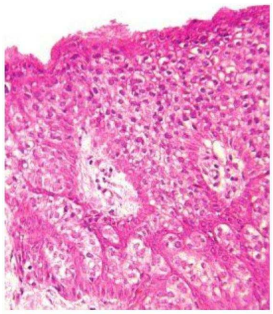
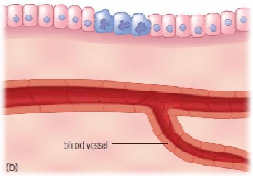


Figure 2 Sample of cancerous skin cells

Activity: Comparing Cancer Cells & Normal Cells

INSTRUCTIONS

B. It takes about 30 doubling times for a cancer cell to form a tumour that is large enough to be felt through the skin with hands. Calculate (i) how many months and (ii) how many cancer cells it would take to form a tumour that could be felt if the doubling rate is two months.



Activity: Comparing Cancer Cells & Normal Cells

How many months and cells to form a tumour that can be felt?

Doubling Time	Months	# Cancer Cells
0	0	1
1	2	2
2	4	4
3	6	8
…	…	…
30	60 (5 years)	1,073,741,824

HOLY **!!**

Activity: Comparing Cancer Cells & Normal Cells

INSTRUCTIONS

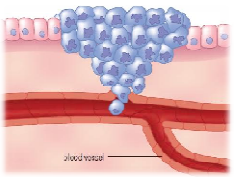
C. Complete the following chart comparing normal cells to cancer cells.

	Normal Cells	Cancer Cells
process	• mitosis (exact copies)	• mitosis (exact copies)
rate of cell division	• controlled	• uncontrolled
functions	• work together • self-destruct when old or damaged	• work alone • metastasis

Activity: Comparing Cancer Cells & Normal Cells

QUESTIONS

1. Look at the diagram to the right.
   (a) What do you think is happening?

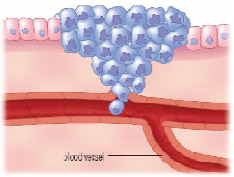


(a) the tumour has broken through into the blood vessel

Activity: Comparing Cancer Cells & Normal Cells

QUESTIONS

1. Look at the diagram to the right.
   (b) If the cancerous cells were left untreated, what do you predict would happen?

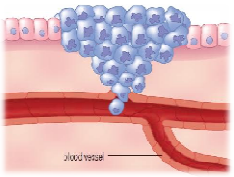


(b) they would travel to other parts of the body via the blood and start new tumours

Activity: Comparing Cancer Cells & Normal Cells

QUESTIONS

2. What are the limitations of a visual inspection as a diagnostic tool for cancer?



it only works if you can see them (i.e. many tumours grow in places where you cannot see them or feel them)

Activity: Comparing Cancer Cells & Normal Cells

QUESTIONS

3. Three samples of cells from three different patients were unlabelled. One sample was from an 85 year old man, one was from a 5 year old boy, and one was from a person with skin cancer. How could you determine to which patient they belonged?

young person – cells should be rapidly developing
skin cancer – abnormal cell growth
old person – less cell growth & more cell repair

Activity: Testing Sunscreen

INTRODUCTION

Sunscreen lotions are designed to protect you against UV radiation. In this activity you will use UV beads to test a variety of sunscreen lotions to see how well they block UV rays.

NOTE!

- This activity is weather permitting – no sun, no activity.
- This is a formal lab report. Be sure to use complete sentences, particularly when it asks you to explain, discuss, describe, …

Activity: Testing Sunscreen

QUESTION

How effective are sunscreens with different Sun Protection Factors (SPF) at blocking UV rays?

HYPOTHESIS/PREDICTION

Write a hypothesis statement about the SPF of sunscreen and its ability to block UV radiation.

EXPERIMENTAL DESIGN

UV beads change colour when exposed to UV radiation. The colour increases in intensity with increased amounts of UV rays. You will use the beads' colour to determine a sunscreens' effectiveness in protecting against UV rays.

Activity: Testing Sunscreen

PROCEDURE

A. Create a table similar to the one below.

Petri Dish	Sunscreen SPF	Indoors (no sun)		Outdoors (direct sun)	
		Colour	Score	Colour	Score
A	none		1		5
B					
C					
D					

B. Obtain 4 petri dishes and label them A, B, C, and D.

C. Place 10 UV beads in each petri dish.

Activity: Testing Sunscreen

PROCEDURE

D. Observe the colour of the beads in dish A, away from sunlight. On a scale of 1 to 5, assign these a colour score of "1".

E. Place dish A in the direct sunlight for 3 min. Observe the colour of the beads. On a scale of 1 to 5, assign these a colour score of "5".

F. Remove dish A from the sunlight and let the beads return to their original colour.

G. Select one of the sunscreens. Spread a small amount of sunscreen over the surface of lid B. Wash and dry your hands. Record the SPF value of the sunscreen in your table.

H. Repeat Step G for dishes C and D, using a different sunscreen for each.

I. Place all four petri dishes in direct sunlight for 3 min. Observe the colour of the beads. Using dish A for comparison, rate the colour of dishes B, C, and D on a scale of 1 to 5.

Activity: Testing Sunscreen

QUESTIONS

1. Which sunscreen gave the most protection? the least? What evidence do you have?
2. Rank the effectiveness of the sunscreens. Did a sunscreen with a higher SPF rating give more protection?
3. Based on your evidence, how reliable are the SPF ratings on the sunscreen containers?