Class Activity

Amoeba cells (unicellular protest) move by forming pseudopodia (false legs), which is cellular crawling characterized by the formation of cellular extensions that pull the cell forward. *Ameba* cells constantly change shape as they move around by pseudopodia. *Amoeba* cells were treated with cytochalasin B, a drug that blocks the formation of microfilaments. Several treatments were tested to validate the effect of this drug. In each treatment, 500 random *Ameba* cells where examined following exposure to treatment, and their shape was noted. Cells that have lost their ability to move by pseudopodia look round under the microscope (see Figure 1 below). The results are shown in Table 2 below.

1. Draw a graph that best represents the results of this experiment.
2. Which statistical test would you use to determine whether there is significant difference between treatments?
3. What can you conclude about the role of the cytoskeleton in *Amoeba* movement by pseudopodia? Justify your answer. (*hint: which type of cytoskeletal proteins plays the most important role in the movement and shape determination in* Amoeba?)

Table 2. Effect of cytoskeletal proteins-disrupting drugs and dinitrophenol on shape determination in *Amoeba* cells.

Treatment	Permanently rounded cells (%)
No drug	3
Cytochalasin B	95
Colchicine (inhibits microtubule formation)	4
Colchicine + cytochalasin B	94
Dinitrophenol (inhibits the formation of ATP)	45
Dinitrophenil + cytochalasin B	96

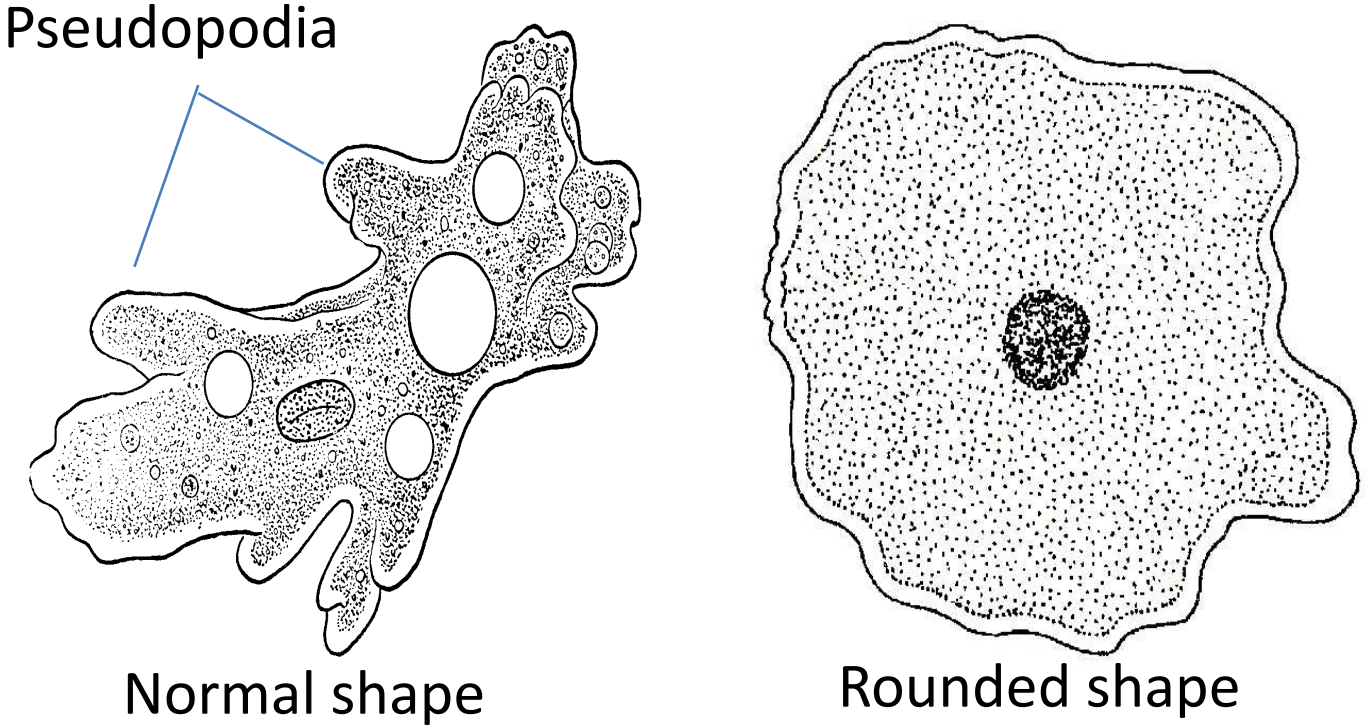
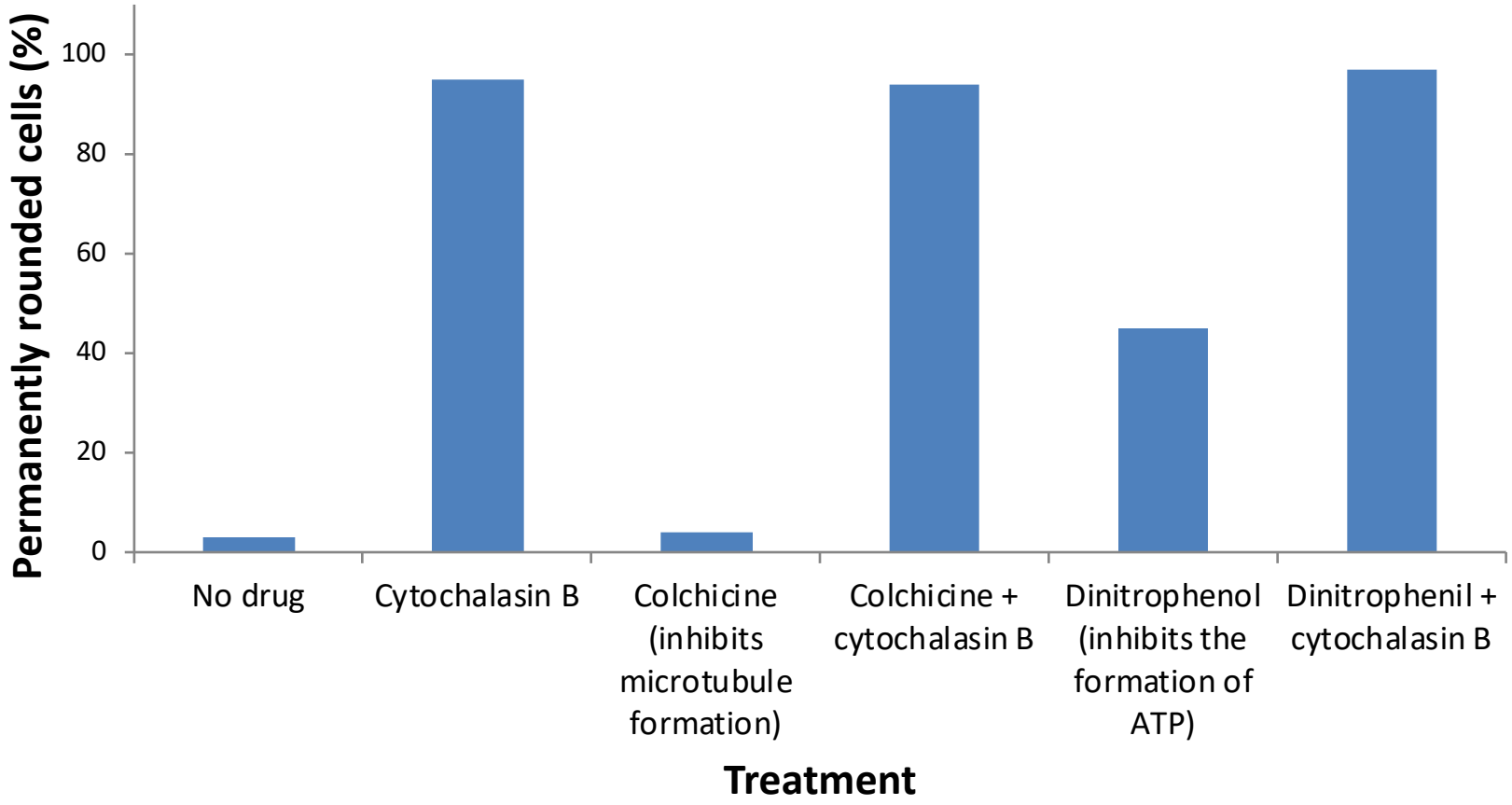


Figure 1. Shape difference between normal *Amoeba* cells moving by pseudopodia and cells that have lost this ability (rounded shape).



Effect of cytoskeletal protein-disrupting drugs and dinitrophenol on shape determination in *Amoeba* cells.

Chi-Square Analysis

	Observed	Expected
No drug	15	282
Cytochalasin B	475	282
Colchicine (inhibits microtubule formation)	20	282
Colchicine + cytochalasin B	470	282
Dinitrophenol (inhibits the formation of ATP)	225	282
Dinitrophenil + cytochalasin B	485	282

P= 9.582E-195

Answers to question 3

- Cytochalasin B: disrupt the formation of microfilaments. Microfilaments play a major role in determining the shape of *Amoeba* cells.
- No involvement of microtubules.
- ATP is needed for the function of microfilaments (high % of rounded cells treated with dinitrophenol).
- Since *Amoeba* cells move by changing shape (pseudopodia), microfilaments are also involved in movement of these cells.