1.3 In Vitro & Animal Studies

One common form of in vitro research is cell culture. This involves growing cells in flasks and dishes. Most of these cells are isolated from a certain tissue such as breast cancer cells, macrophages, etc. This technique is especially common in cancer research where the cells can be placed on a plate containing wells. Some wells are then treated with a diet compound to compare the growth of the treated cells versus the untreated wells (control).

![Cell culture equipment](image)

Figure 1.31 Cell culture equipment

In order for cells to grow they need a nutrient source. For cell culture the nutrient source is referred to as media. Media supplies nutrients to the cells in vitro similarly to how blood performs this function within the body. Most cells adhere to the bottom of the flask and are so small that a microscope is needed to see them.

![Cell culture flasks](image)

Figure 1.32 Cell culture flasks

Cells are only handled inside a biosafety cabinet (aka cell culture hood). The hood is sterile and protects the cells from the outside environment. The cells need to be protected because they do not have human skin as a barrier to keep microorganisms etc. from contaminating them.
Cells are grown inside an incubator, which is a device that provides the optimal temperature, humidity, and carbon dioxide (CO₂) concentrations for cells and microorganisms. By imitating the body's temperature and CO₂ levels (37 degrees Celsius, 5% CO₂), the incubator allows cells to grow even though they are outside the body.

Animal Studies

Animal studies are one form of *in vivo* research, which translates to "within the living". Rats and mice are the most common animals used in nutrition research.

Why do animal research?

Animals can be used in research that would be unethical to conduct in humans. Researchers can make sure that a certain regimen is safe before it is researched in humans. One advantage of animal dietary studies is that researchers can control exactly what the animals eat. In human studies, researchers can tell subjects what to eat, provide them with the food, but that does not necessarily mean that they are going to consume exactly what they are supposed to. Also
people aren't great at estimating, recording, or reporting how much or what they eat/ate. Animal studies are also normally far less expensive than human studies.

There are some important factors to keep in mind when interpreting animal research. First, an animal’s metabolism and physiology is different than humans. As a result, animals' absorption and bioavailability of compounds can differ from humans. Furthermore, animal models of disease (cancer, cardiovascular disease etc.), although similar, are different from the human disease. So these factors have to be considered when interpreting results from this type of research. Nevertheless, animal studies have been, and continue to be, important for nutrition research.

No References