

Mutations do not necessarily cause a problem; instead they may create a different or even better version of a protein. In this way, mutations add to the diversity of organisms. Natural selection works on this diversity by selecting the individuals most suited to an environment. Farmers rely on this diversity to improve crops and to increase productivity.

Causes of mutation

Agents that cause mutation are called **mutagens** (Figure 2.4.13). These fall into a few main groups, and include chemical and physical agents. Table 2.4.1 lists examples of common agents that cause mutations.

If an agent causes a mutation that leads to cancer, it is also called a **carcinogen**. A mutation may cause breaks in DNA, replace a normal base, form abnormal bonds between bases, or activate genes that cause the cell to grow out of control.

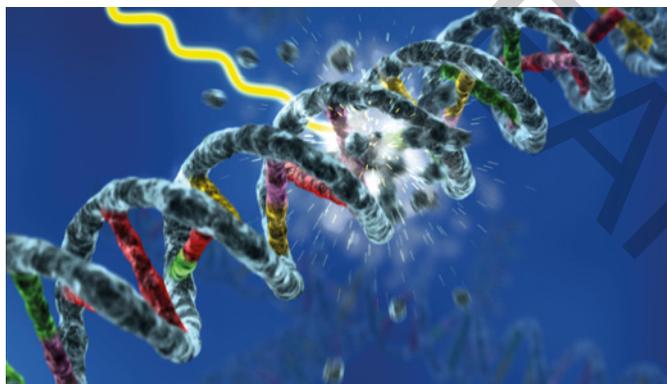


FIGURE 2.4.13 Mutagens are agents that damage DNA and cause mutations.

TABLE 2.4.1 Examples of common agents that cause mutations

Radiation	Chemical	Biological
X-rays radioisotopes: e.g. uranium UV light—sunlight, UV tanning beds	cigarette smoke asbestos mustard gas benzene some metals: e.g. arsenic, cadmium formaldehyde ethyl alcohol	hepatitis B virus—liver cancer human papilloma virus (some strains)—cervical cancer

Working with Science

GENETIC COUNSELLOR

Matthew Burgess

Genetic counsellors provide individuals, couples and families with information and support about genetic conditions and the associated medical, psychological and family planning issues. They support clients before and after genetic testing and diagnosis, to help them understand their



FIGURE 2.4.14
Matthew Burgess

condition and make changes in their lives for the best health outcomes. Genetic counsellors need to enjoy working with people, be compassionate and have excellent communication skills.

Matthew Burgess (Figure 2.4.14) decided to become a genetic counsellor at 15, after his science teacher moved into this field. Matthew liked the idea of a job where he could combine his interest in genetics with talking to people. Matthew started out in prenatal genetic counselling. This involved working with pregnant women and couples planning to have children to assess their risk of having a child with a genetic condition, advise them of their options and help them prepare for life with their child.

Because genetic technology is rapidly advancing, genetic counselling is an exciting and dynamic field to work in. The demand for genetic counselling services is growing and genetic screening and diagnostics technology is more widely available. To become a genetic counsellor, you will need to complete a Bachelor of Science and a two year Masters of Genetic Counselling.

Review

- 1 Name three other types of health care professionals that genetic counsellors might work with.
- 2 What do you think are some of the positive and negative points of genetic testing?