



St. Jude Children's Research Hospital

CANCER EDUCATION

DNA HOME KIT





Celebrating DNA



is National DNA Day!

National DNA Day commemorates the 1953 discovery of DNA's double helix and the successful completion of the Human Genome Project in 2003.

It is important to celebrate the men and women who helped us understand DNA. In this book, you will read about some of them and their DNA discoveries.

All About DNA

DNA stands for **deoxyribonucleic acid**.

DNA carries the details for how a living thing looks and functions.

Genes are small sections of DNA that carry specific types of information.

Genes carry information for things like:



eye color



fingerprints



height

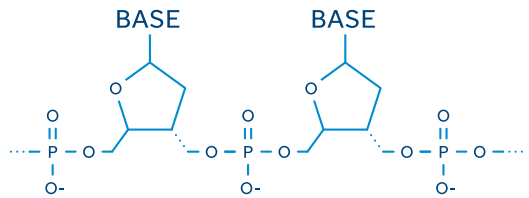


Double Helix

The shape of DNA is called a double helix. It looks like a spiral staircase.

DNA Backbone

The rails are called the DNA backbone. They are made of repeating deoxyribose sugar and phosphate molecules.



Thymine

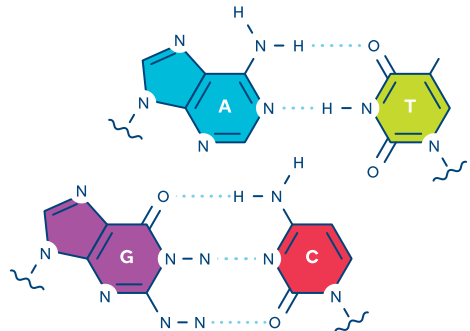
Guanine

Adenine

Cytosine

Nucleotide Base Pairs

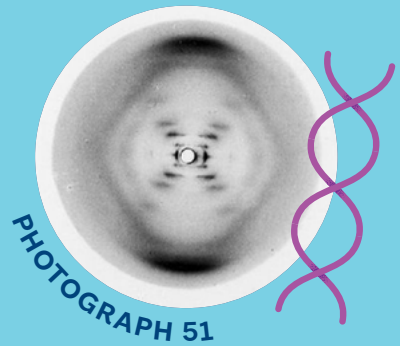
The steps are made of nucleotide bases that pair together. Adenine always pairs with thymine. Guanine always pairs with cytosine.



Who discovered DNA's structure?

In 1953, James Watson, Francis Crick, Maurice Wilkins and Rosalind Franklin discovered DNA's structure.

Rosalind Franklin was a chemist and X-ray crystallographer. **Photograph 51** is an image of X-ray data from her research. It was the final clue to solve the mystery of DNA's double helix structure.



Do you know your DNA?

Color the DNA strand and label the nitrogenous bases to create pairs.

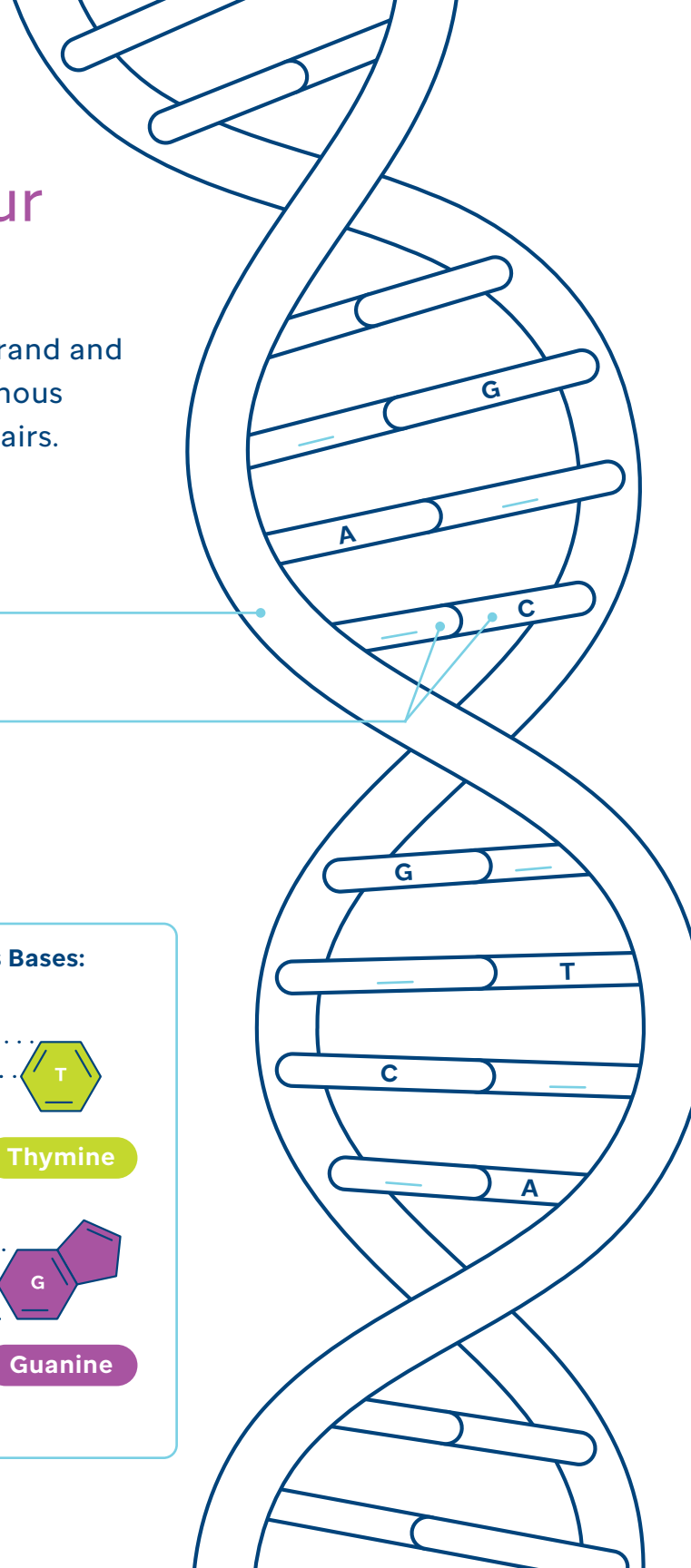
Sugar-Phosphate Backbone

Nucleotide Base Pairs

Nitrogenous Bases:

Adenine + **Thymine**

Cytosine + **Guanine**



The Human Genome

DNA is in the cells of every living thing.

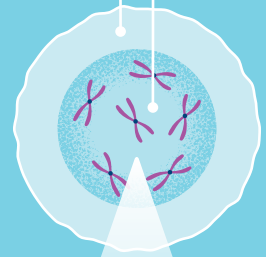
Genes are pieces of DNA that carry instructions to make proteins. All the genes in our body make up our genome.

A **genome** is the entire set of DNA information found in a cell.

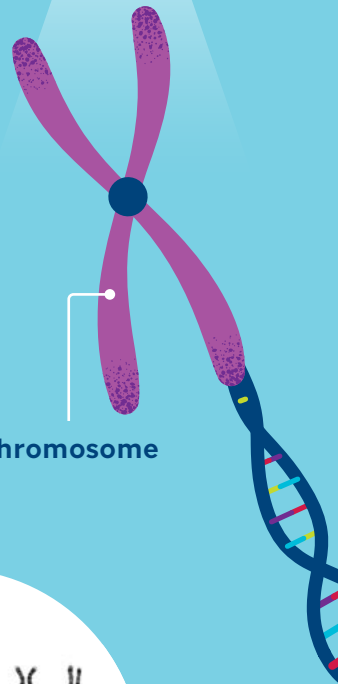
The human genome is made of 23 pairs of **chromosomes**, found in the cell nucleus.

In humans, most of the DNA is in the **cell nucleus**.

Cell Nucleus



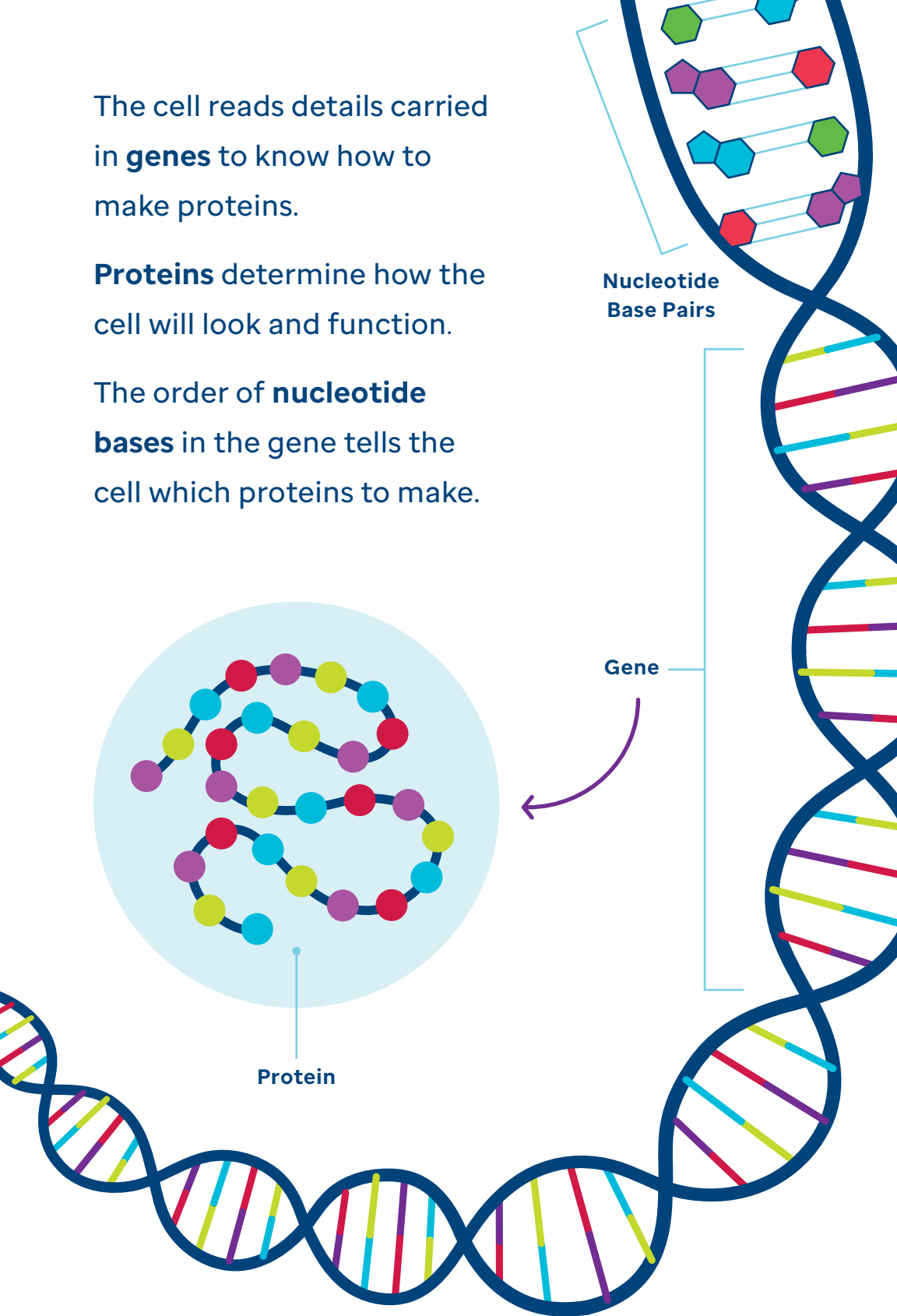
Chromosome



The cell reads details carried in **genes** to know how to make proteins.

Proteins determine how the cell will look and function.

The order of **nucleotide bases** in the gene tells the cell which proteins to make.



DNA WORD SEARCH

N L Q E U B S H Y Z D V B I E
I L E G Z U Z R E B S N W M D
T E K N E P R O T E I N A G I
T C O L I G S F Q Q T G B L T
Z H C U E N U Y J Y E F Q R O
Z U Y N S V E F W M Y X F P E
N W O M A G W D O Q T G C V L
L M Y Q I Z W S A I A B B Y C
E X R I B N O E N I N A U G U
X G Q A S M E P V I G X H G N
Y I M U O D R B Z Z E U H U P
A J L R C Y T O S I N E X K A
O Y H E C Q H B P Y E J H N W
O C A V H W Z W Q N W I B B Y
P X Y J R Z B P T D T Y D U Z

Adenine

Cell

Chromosome

Cytosine

DNA

Gene

Genome

Guanine

Helix

Nucleotide

Nucleus

Protein

Thymine

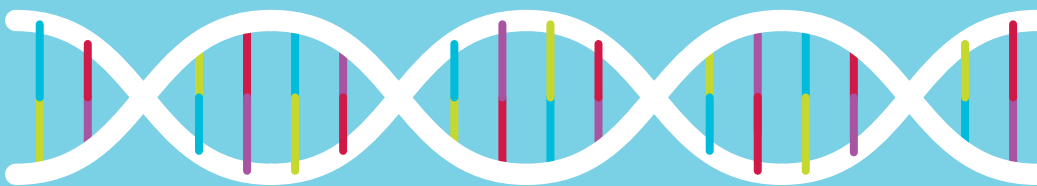
What was the Human Genome Project?



In 2003, scientists completed the Human Genome Project. Scientists wanted to know the order of nucleotide bases in each gene. They also wanted to know where in the DNA each gene was located.

Data from the Human Genome Project can be used to better understand the human body.

Scientists look for DNA changes linked to differences in how people look and function. This can tell us how genes relate to health and disease.



DNA and Cancer

When DNA works correctly, it helps the body function properly. Sometimes, DNA can become damaged, and it no longer works.

Some sources of DNA damage are UV rays from the sun, chemicals and radiation, tobacco products and some viruses. The human papilloma virus (HPV) is one type of virus that damages DNA.

Cancer is a disease of abnormal cell growth. When genes that tell the cell how to grow are damaged, cancers can form.

Sources of DNA Damage:



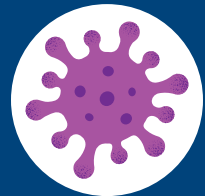
**UV rays from
the sun**



**radiation
& chemicals**



**smoking or
tobacco products**



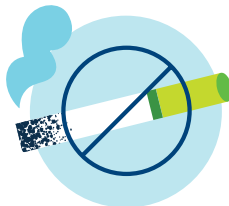
**cancer-causing
viruses, like HPV**

Protecting your DNA

There are ways to protect your DNA from damage. Eating nutrient-rich foods and getting plenty of exercise will protect your DNA. Use sunscreen, wear protective clothing and limit time in the midday sun to protect against UV rays. Do not smoke or use tobacco products, and avoid being around others who smoke. Get the HPV vaccine to prevent cancer-causing viruses.



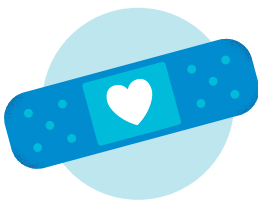
**eat fruits and
vegetables**



**do not
smoke**



**use
sunscreen**

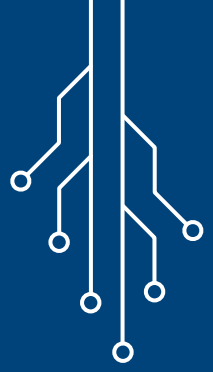


**get
vaccinated**



**exercise
regularly**

What is the Pediatric Cancer Genome Project?



In 2010, St. Jude Children's Research Hospital and Washington University School of Medicine began the Pediatric Cancer Genome Project. Scientists wanted to understand the DNA damage that causes cancer in children.

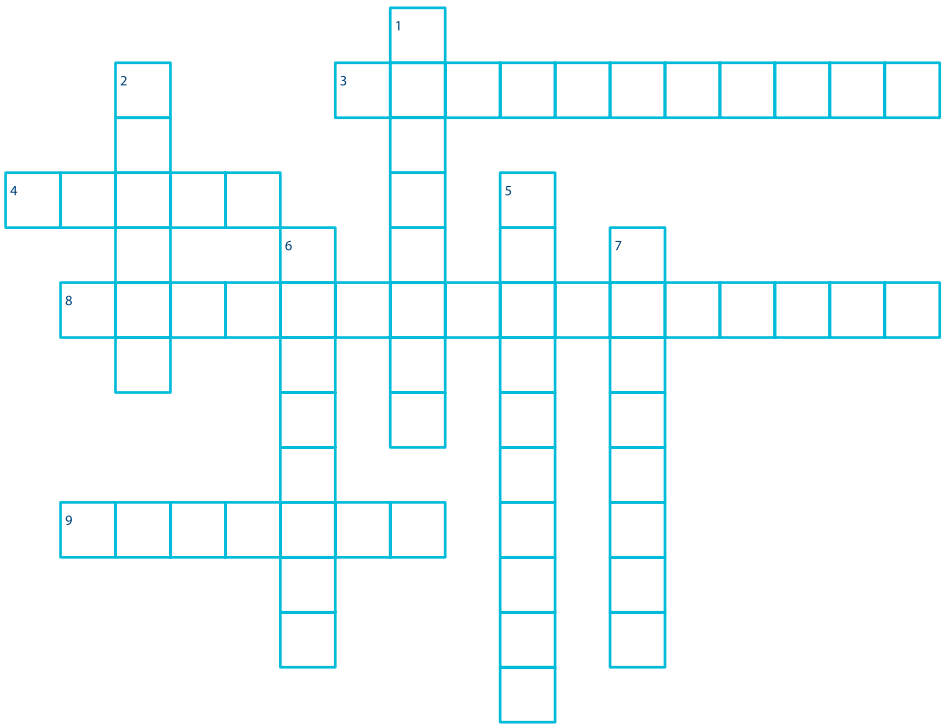


Data from this project will help make better treatments for children with cancer.

The St. Jude Cloud is an online platform that allows scientists at St. Jude to share the data with scientists worldwide.



DNA CROSSWORD



Down:

1. _____ Franklin was a chemist and X-ray crystallographer
2. A disease of abnormal cell growth
5. The final clue to solve the mystery of DNA's double helix structure
6. Nucleotide bases are Adenine, Thymine, Guanine and _____.
7. Eating a _____ - rich diet can protect DNA

Across:

3. The shape of DNA that looks like a spiral staircase.
4. Small sections of DNA that carry specific types of information
8. DNA stands for _____ acid.
9. _____ or tobacco products can damage DNA.

DECODE THE ALIEN GENOME

Use the key provided to decipher the code in the alien genome.

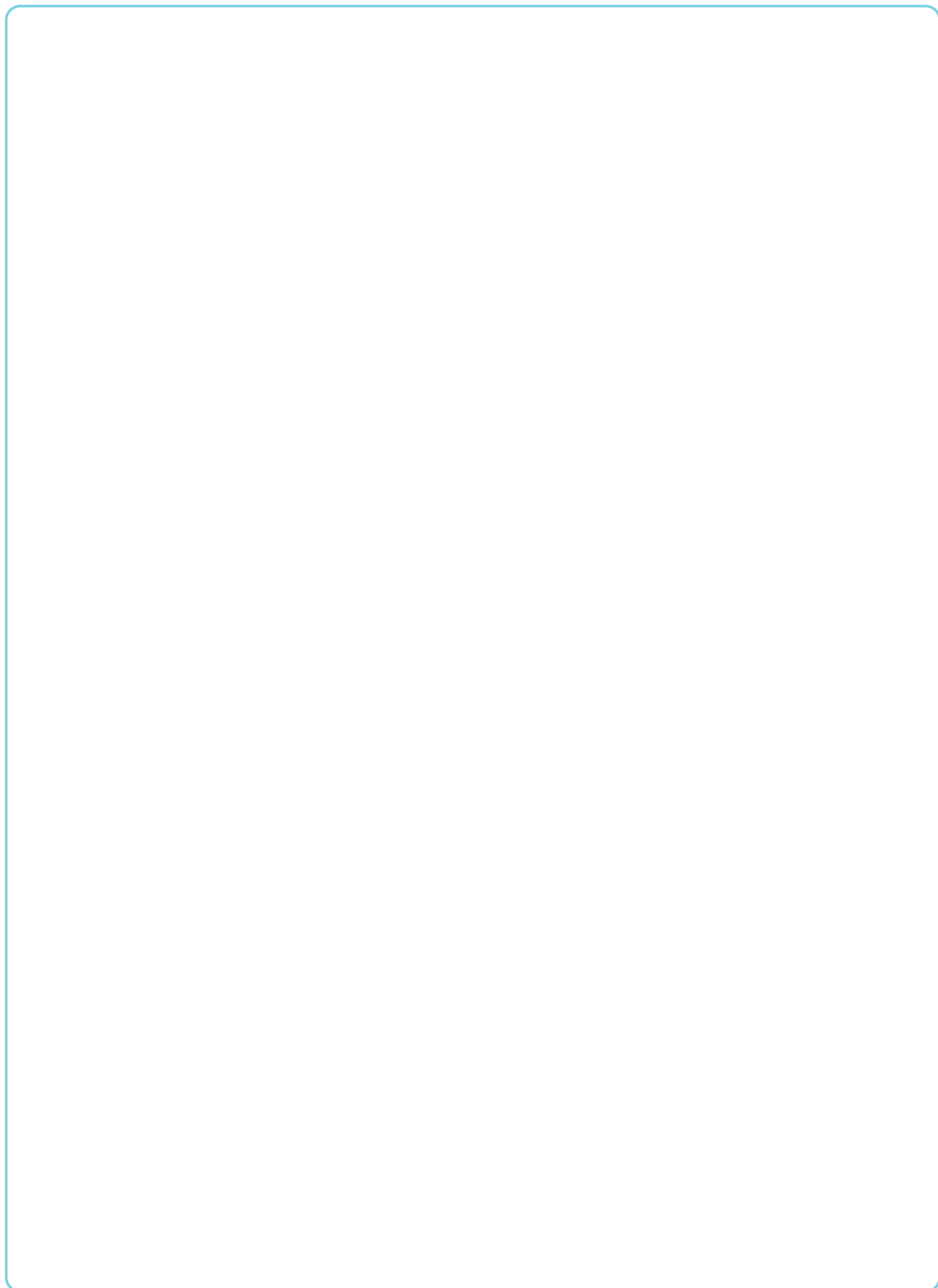
Alien Genome

— — — — —	— — — — —	— — — — —
— — — — —	— — — — —	
— — — — —	— — — — —	— — — — —
— — — — —	— — — — —	
— — — — —	— — — — —	— — — — —

Genome Key

A	E	I	M	Q	U	Y
B	F	J	N	R	V	Z
C	G	K	O	S	W	
D	H	L	P	T	X	

DRAW YOUR ALIEN

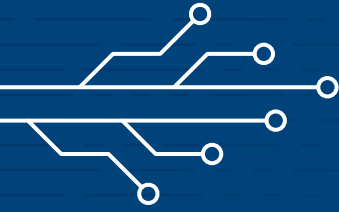


Resources about **Cancer and Cancer Prevention**



Scan the QR code to find additional information about cancer and cancer prevention.





Cancer Education and Outreach Program

Mail Stop 762
262 Danny Thomas Place
Memphis, TN 38105

stjude.org

