nce		Traditionally drugs were extracted from plants and microorganisms										
		Digitalis	Aspirin	Penicillin								
olant		Extracted from foxglove plants and used as a heart drug	A painkiller and anti-inflammatory that was first found in willow bark	Discovered by Alexander Fleming form the <i>Penicillium</i> mould and used as an antibiotic								
trom a plant												
			drugs have to be									

trialled before being used to check they are safe and effective

e	Efficacy	Make sure the drug works
drugs a ensively ted for:	Toxicity	Check that the drug is not poisonous
New exto	Dose	The most suitable amount to take

Most new drugs are synthesised by chemists in the pharmaceutical industry. However, the starting point may still be a chemical extracted

Preclinical trials - using cells, tissues and live animals - must be carried out before the drug can be tested on humans.

Clinical trials use healthy volunteers and patients

Stage 1	Stage 2	Stage 3	Stage 4	
Healthy voluntee rs try small dose of the drug to check it is safe record any side effects	A small number of patients try the drug at a low dose to see if it works	A larger number of patients take the new drug and different doses are trialled to find the optimum dose	A double blind trial will occur to see how effective the new drug is. The patients are divided into groups. Some will be given the drug and some a placebo.	Monoclonal antibodies (Biology HT)

Monoclonal antibodies are specific to one binding site on

the antigen. This means monoclonal antibodies can

target specific chemicals or cells in the body

The emergence of bacterial strains resistant to antibiotics is of great concern

> **Bacteria** can mutate

Sometimes this makes them resistant to antibiotic drugs.

Discovery and drug development

Antibiotics and painkillers

> **AQA INFECTION AND**

RESPONSE

disease by killing infective bacteria inside the body. antibiotics e.g. penicillin Specific bacterial infections require specific antibiotics.

Use of antibiotics has greatly reduced

deaths from infectious bacterial disease

Drugs that help cure bacterial

Painkillers Drugs that are used to treat e.g. aspirin, and other the symptoms of a disease. paracetamol medicines , ibuprofen They do not kill pathogens

develop drugs to kill viruses without harming body tissues

PiXL

Antibiotics

cannot be

use to

treat viral

pathogens

It is difficult to

inside cells

because viruses live and reproduce

Vaccination

Vaccination can be used to immunise a large proportion of the population to prevent the spread of a pathogen

White blood cells detect pathogens in the

In a double blind trial the patients and scientists do not know who receives the new drug or placebo until the end of the trial. This avoids bias

A vaccine contains a small amount of dead or inactive form of the pathogen than can be introduced into the body

1st infection by pathogen Re-infection by the same

pathogen

vaccine. Antibodies are released into the blood. Pathogens are destroyed by the antibodies. White blood cells detect pathogens.

Antibodies are made and released into the blood much faster and in larger amounts. Pathogens are destroyed by the antibodies much faster.

population is prevented the harmful disease and suffer the symptoms of Vaccination means that a person is unlikely to

Monoclonal antibodies create more side effects than expected (fatal in some cases) and are not as widely used as everybody hoped when first developed

A placebo can look identical to the new drug but contain no active ingredients

Identical copies of one types antibody produced in **laboratory** 1. A mouse is injected with pathogen

Vaccination

- 2. Lymphocytes produce antibodies
- 3. Lymphocytes are removed from the mouse and fused with rapidly dividing mouse tumour cells
- 4. The new cells are called hybridomas
- 5. The hybridomas divide rapidly and release lots of antibodies which are then collected

Monoclonal antibodies can be used in a variety of ways											
Diagnosis	Detecting pathogens	Detecting molecules	Treatment								
e.g. pregnancy test – measure the level of hormones	Can detect very small quantities of chemicals in the blood	Fluorescent dye can be attached so it can be seen inside cells or tissues	Bound to radioactive substance, toxic drug or chemical which stops cancer cells growing and dividing. Cancer cells are targeted to normal body cells are unharmed								

better hope – brighter future

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New medical drugs have to be tested and trialled before being used to check they are safe and effective

Stage 4

Efficacy	Make sure the drug works
Toxicity	Check that the drug is not poisonous
Dose	The most suitable amount to take

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Stage 1

Stage 2

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Stage 3

A double blind trial A larger Monoclonal antibodies Healthy number of will occur to voluntee A small patients see how rs try number take the effective the (Biology HT) of small new drug new drug is. dose of patients and The patients the drug try the different are divided to check drug at a doses are into groups. it is safe low dose trialled to Some will record to see if find the be given the any side it works drug and optimum effects dose some a placebo.

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AQA
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