

Turning a compound into a medicine:

**(With a focus on Clinical Trials and a brief
introduction to Gene Therapy)**

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Discovering and developing a new medicine

Create it

What is the disease target? How might we 'treat' it?

Make it

We have the idea, now what chemicals might do what we want?

Test it (pre-clinical)

Before first time in humans

Test it (Clinical Trials)

Prove it works and that it is safe to use. Four phases

Register it

File and launch in countries world wide

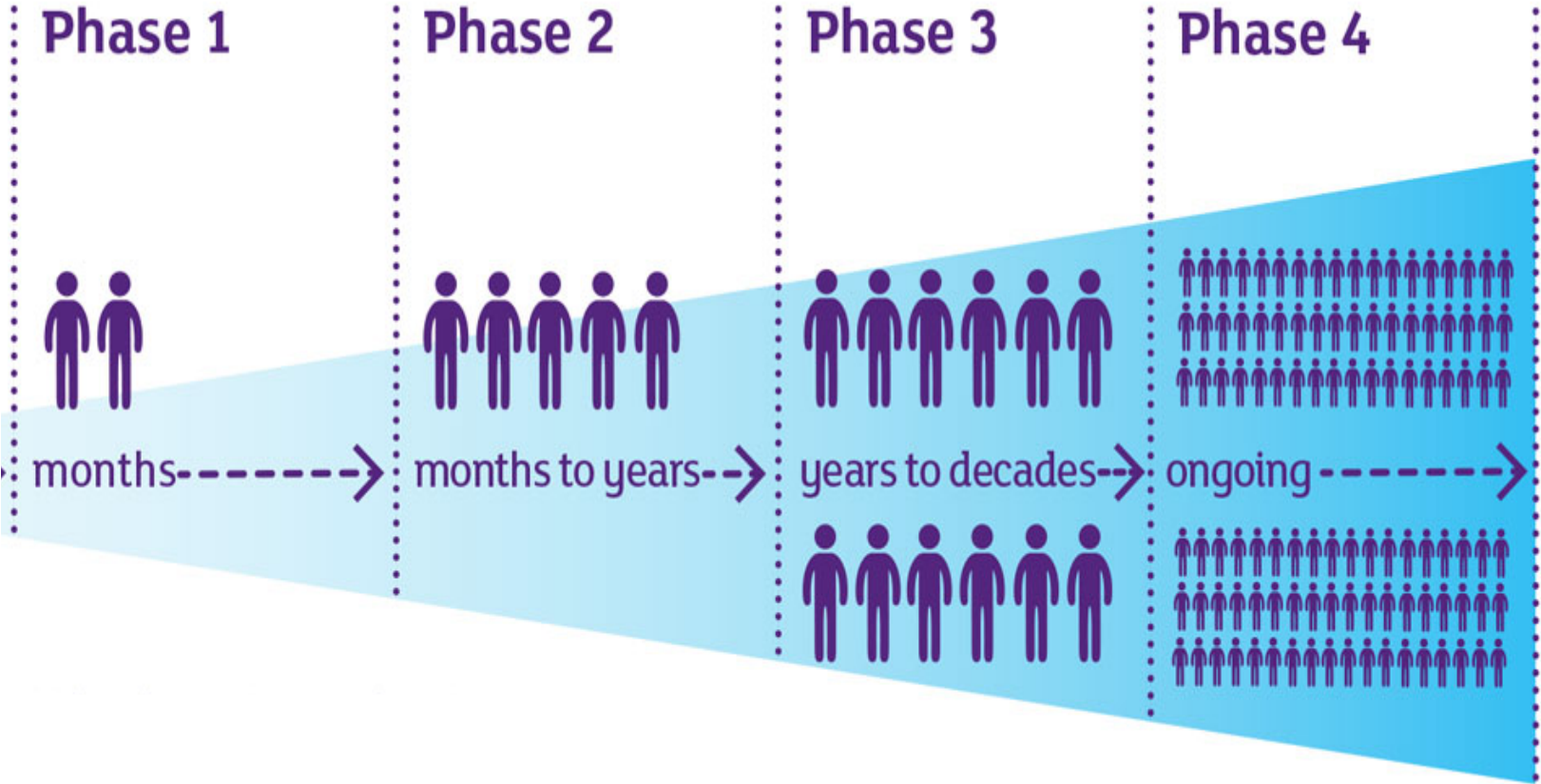
Sell it

Manage it over its patent life

It can take 10-15 years and £800 to £1000 million to do this!

The stages of clinical trials

Pre Clinical



The four phases of clinical trials

Phase I trials

Three main aims – **Safety, Safety and Safety**

First administration to humans

- ◆ Single dose in [*healthy*] human volunteers
- ◆ Safety, tolerance and side effects
- ◆ Pharmacokinetics – how does the drug get to where it's needed
- ◆ Pharmacodynamics – what range of effects does it have?
- ◆ Efficacy (*if feasible*) – does it do what we hoped?

Quite often now, with more advanced treatments such as gene therapy, we may skip the phase I studies and go straight to phase II

The four phases of clinical trials....

Phase II trials

- ◆ Safety evaluation is still the main aim
- ◆ Much more focus on efficacy – is it doing what we hoped?
- ◆ Side effect profile – more information on when/if side effects occur
- ◆ Often look for responses to increasing doses (a dose-response curve) – find the best dose for patients
 - Allows design and dose determination for Phase III

The four phases of clinical trials....

Phase III trials

Time to boost the patient numbers in order to:-

- ◆ Prove it is effective and safe to use
- ◆ Demonstrate therapeutic advantage (if there is a similar drug out there at the time and it is feasible)
- ◆ Demonstrate pharmacoeconomic value
- ◆ Establish therapeutic profile
 - Indications, dosage, side effects, contra-indications

The four phases of clinical trials....

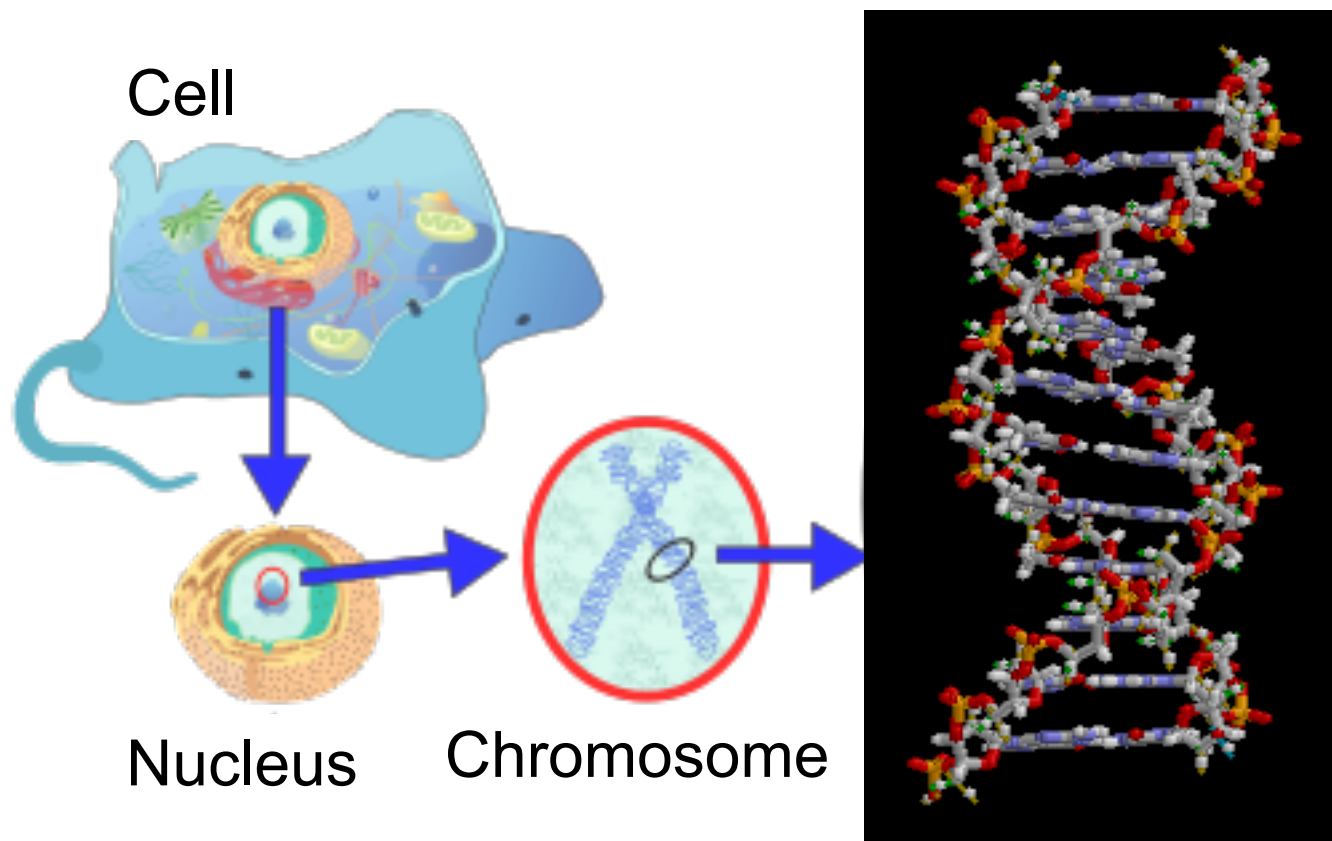
Phase **IV** trials

Time to extend the numbers

- ◆ If one takes place it is after a drug has been licenced for prescription
- ◆ Captures more data on safety in the real world
- ◆ We may look for information in other patient groups such as DMD boys in a different age range

Any questions before we move on to the world of genetics?

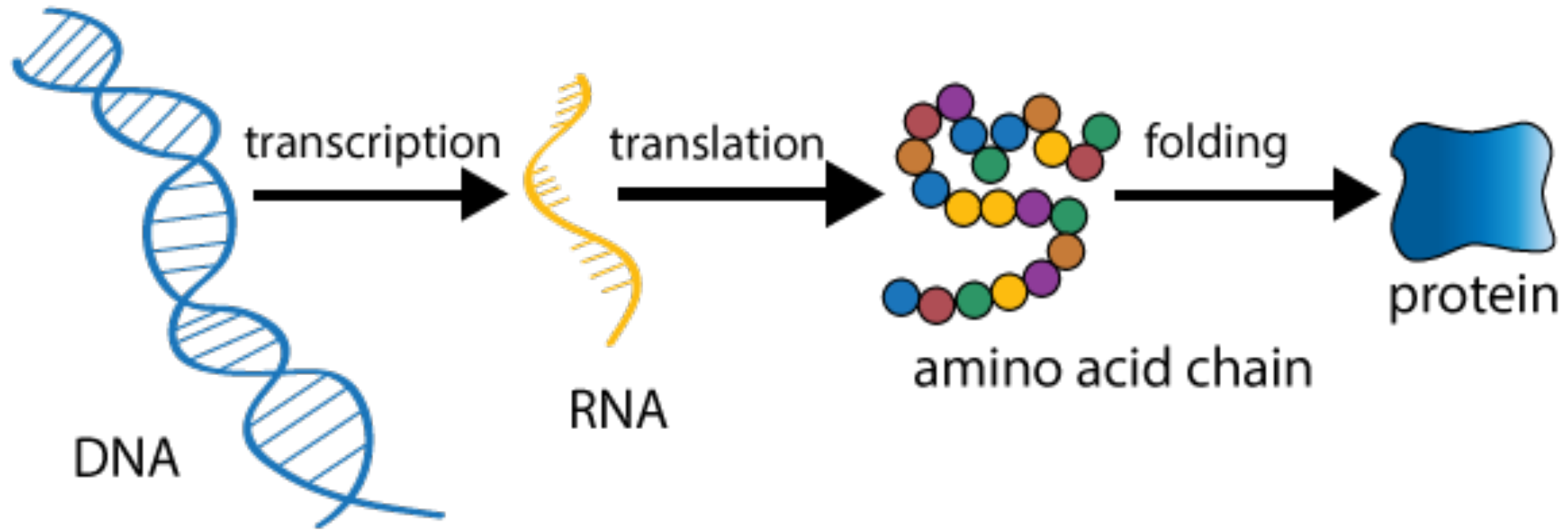
Now for some genetics



The order of the 'rungs' in sections of the DNA 'ladder' are genes.

Deoxyribose Nucleic Acid
DNA

From Genes to Proteins



In DMD, the instructions for making Dystrophin are wrong or missing and so the protein is not made

Gene Therapy

