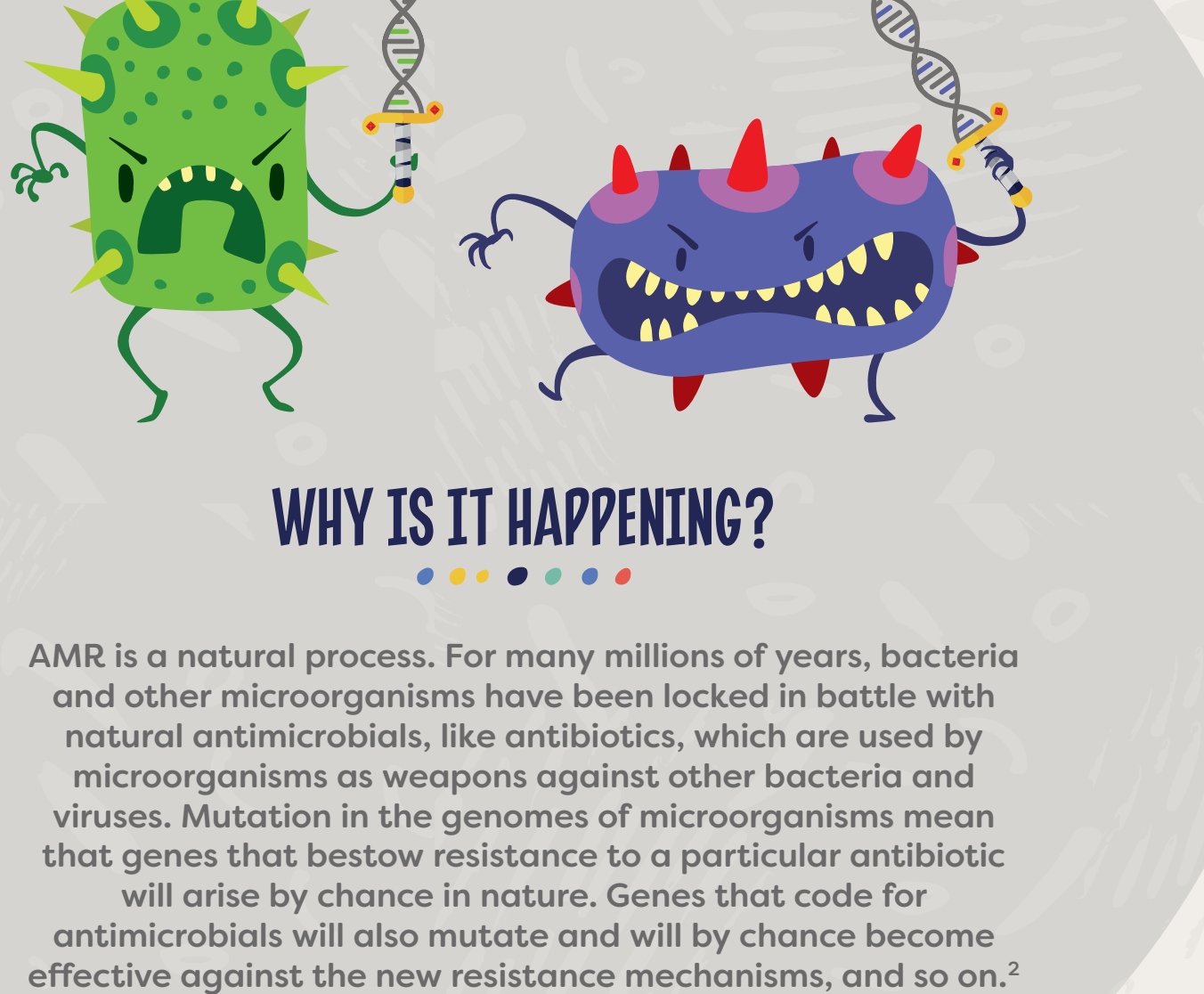


ANTIMICROBIAL RESISTANCE

WHAT IS ANTIMICROBIAL RESISTANCE?

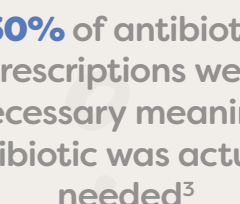
The World Health Organization (WHO) defines antimicrobial resistance (AMR) as the ability of a microorganism, like bacteria or viruses, to prevent antimicrobial compounds from working against it.¹ This means that treatment normally used against these microorganisms become ineffective, and the microorganisms may become a serious health hazard.



WHY IS IT HAPPENING?

AMR is a natural process. For many millions of years, bacteria and other microorganisms have been locked in battle with natural antimicrobials, like antibiotics, which are used by microorganisms as weapons against other bacteria and viruses. Mutation in the genomes of microorganisms mean that genes that bestow resistance to a particular antibiotic will arise by chance in nature. Genes that code for antimicrobials will also mutate and will by chance become effective against the new resistance mechanisms, and so on.²

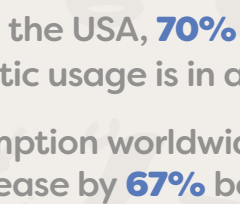
THE EXTENSIVE USE OF ANTIBIOTICS BY HUMANITY HAS CHANGED AMR FROM A MICROSCOPIC BATTLE TO A GLOBAL WAR.



MEDICAL USE

30% of antibiotic prescriptions are unnecessary meaning no antibiotic was actually needed³

Consumption of antibiotics increased by **35%** between 2000 and 2010⁴



AGRICULTURE USE

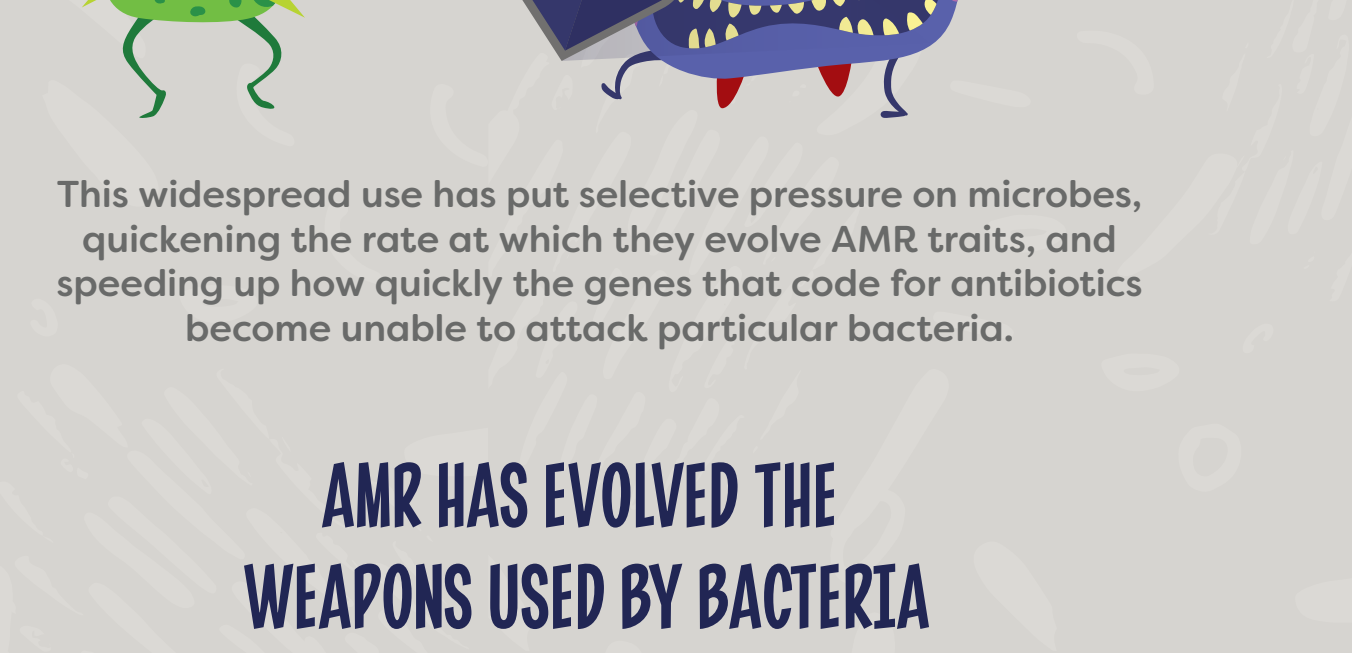
In the USA, **70%** of antibiotic usage is in animals⁵

Consumption worldwide is set to increase by **67%** between 2010 and 2030⁵

50% of European cereal and grapevine production is treated at least once per year with azole antifungals⁶

75-90% of antibiotics pass through livestock unmetabolized and then risk driving antibiotic resistance in the wider environment⁷

AMR HAS EVOLVED THE DEFENSES USED BY BACTERIA



This widespread use has put selective pressure on microbes, quickening the rate at which they evolve AMR traits, and speeding up how quickly the genes that code for antibiotics become unable to attack particular bacteria.

AMR HAS EVOLVED THE WEAPONS USED BY BACTERIA

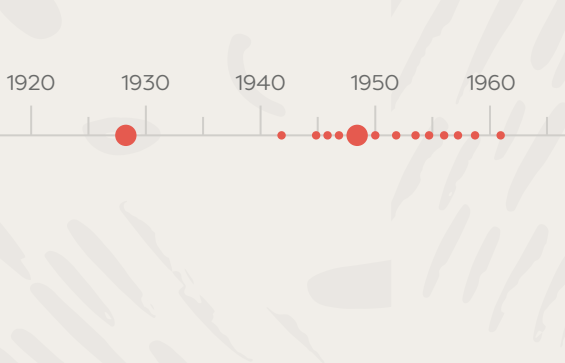


There is also evidence that AMR can increase the virulence of microbes, making them deadlier as well as better able to defend themselves.⁸

WHY SHOULD WE BE WORRIED?

AMR is already spreading fast - in the USA a minimum of

2 MILLION PEOPLE EACH YEAR become infected with antibiotic resistant bacteria⁹



We aren't spending on the problem - just **1.2%** of the NIH budget was spent on AMR research between 2009 and 2014¹⁰

The rate of antibiotic production has slowed - no new major group of antibiotics has been created in the last 30 years¹¹

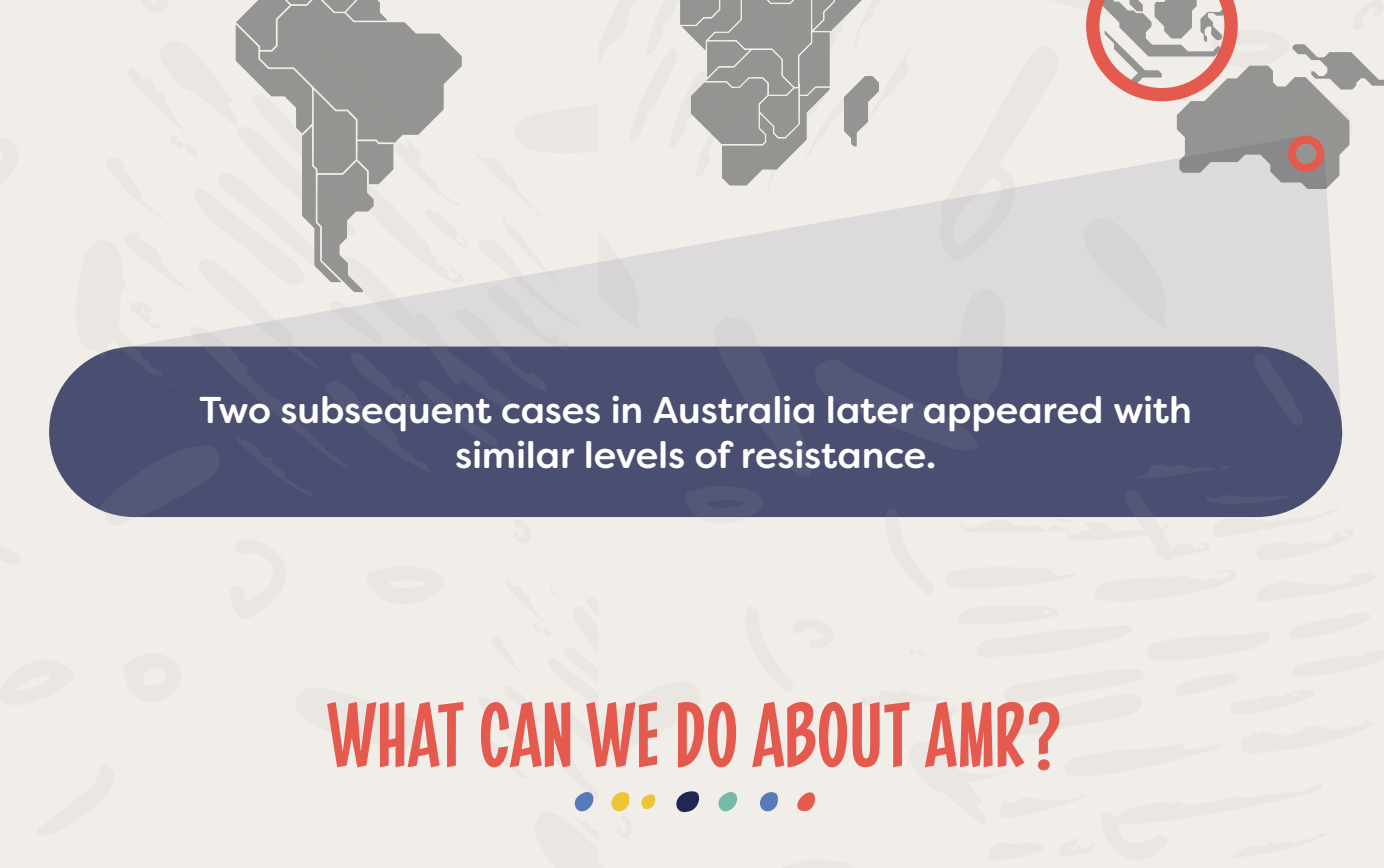


It's not just antibiotics - Amantadine, a drug used to treat influenza for many years was dropped from recommended use in 2008/2009 after

100% OF FLU VIRUSES PROVED RESISTANT TO IT¹²

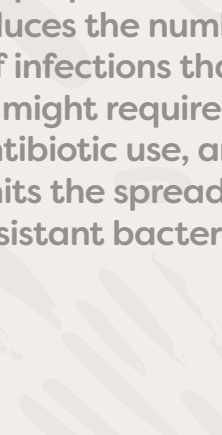
ANTIBIOTIC RESISTANCE: A GLOBAL THREAT

One infection of the bacteria *Neisseria gonorrhoeae* in the UK, picked up after a man had sexual intercourse in south-east Asia, was resistant to the currently recommended first-line dual therapy (ceftriaxone and azithromycin) and was only cured with last-resort spectinomycin.¹³



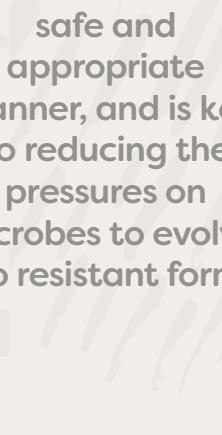
Two subsequent cases in Australia later appeared with similar levels of resistance.

WHAT CAN WE DO ABOUT AMR?



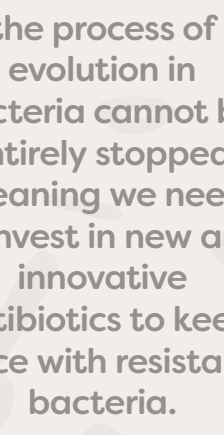
AVOID INFECTION!

Immunization, better hygiene and safe food preparation reduces the number of infections that might require antibiotic use, and limits the spread of resistant bacteria.



USE FEWER ANTIMICROBIALS

Antimicrobial stewardship means committing to using antimicrobials in a safe and appropriate manner, and is key to reducing the pressures on microbes to evolve into resistant forms.



PUT MORE MONEY INTO ANTIMICROBIALS

Even if we can reduce the number of antibiotics used, the process of evolution in bacteria cannot be entirely stopped, meaning we need to invest in new and innovative antibiotics to keep pace with resistant bacteria.

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