Expert Answer

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Answer at a Glance:

- Companies with patented chemical technologies will generally try to patent all *reasonable* potential uses of that chemical in order to obtain maximal return on their research investments.
- When glyphosate is used as recommended, it is not used in concentrations that are high enough for it to function as an antimicrobial.
- Glyphosate is not used in clinical medicine (and has no relatives used in medicine, either); therefore, the use of glyphosate in agriculture has nothing to do with resistance to antibiotics used in human medicine.

Companies with patented chemical technologies will generally try to patent all reasonable potential uses of that chemical in order to obtain maximal return on their research investments. Such uses cannot be speculative — we can't patent glyphosate as jet fuel or nail polish remover, because it clearly does not do those things — but glyphosate does inhibit an enzymatic pathway in many bacteria and parasites, and a reasonable case can be made that glyphosate might be effective as an antimicrobial. (Technically, an antibiotic is naturally occurring, while antimicrobial covers a broader range of compounds, but most people use the terms interchangeably today.)

A lot stands between a compound with antimicrobial activity in the test tube and a clinically effective antimicrobial agent. Alcohol kills microbes, but taking a beer for your earache is not going to work — you can't get a high enough alcohol concentration in the body to kill the bacteria without killing the patient first. Sufficiently high concentrations of glyphosate can kill microbes in a test tube, but to be effective clinically, one needs to be able to:

1. Achieve reliably effective concentrations with a reasonable oral (or IV) dose in humans. This is difficult to achieve with glyphosate, especially orally.

2. Have a workable dosing frequency, meaning you can take (or give) the antibiotic every 8-12 hours or less without the concentration falling below effective levels in the body. We used to give a lot of antibiotics every six hours or less, but compliance is very poor. Glyphosate has a short persistence in humans (half of an absorbed dose is excreted in around two hours).

3. Affect microbes via a mechanism that still works in the body. Glyphosate blocks the production of certain amino acidsin bacteria, and the bacteria will die, or at least stop reproducing, if they cannot obtain these nutrients from the environment … but blood and tissues are not water — they are chock-full of the nutrients that microbes need to survive.

4. Avoid toxicity to the patient. Here, glyphosate is actually a winner — it has extremely low mammalian toxicity, does not undergo metabolism and is rapidly excreted in urine.

The bottom line is that, to date, nobody has demonstrated that glyphosate is an effective antimicrobial agent for treating human or animal infections.

The overuse of antibiotics in humans and the intensive use in hospital settings is a major problem, but use of antibiotics in agriculture can sometimes result in the selection of antibiotic-resistant organisms, and these organisms may then cause problems in the form of resistant human infections. This matters only if a chemical (or a close relative with cross-resistance) is use in *both* clinical medicine and agriculture. Because glyphosate is not used in clinical medicine (and has no relatives used in medicine, either), the use of glyphosate in agriculture has nothing to do with resistance to antibiotics used in human medicine.