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I am writing this letter as a microbiologist.

Many scientists appear to consider that they should be allowed to carry out any experiments they like unless those experiments can be shown to be dangerous. I have found, by chance, that a very dangerous experiment on an anti-microbial peptide, defensin, is being undertaken in Japan. Defensins are made by plants and animals, and are very important in providing them with protection against pathogens.

Zhang et al. (2002) have reported that long-term nonprogressors with HIV-1 infection secreted alpha-defensins, and that the alpha-defensins inhibited HIV-1 replication. If human defensins were effective in killing HIV-1, and were used as a specific medicine for HIV-1, defensin-resistant HIV-1 would then appear, and those infected with this virus would develop symptoms more rapidly and die more quickly. Thus, defensin-resistant pathogens would enhance their pathogenicity and infectivity, and cause far more terrible problems than antibiotic-resistant pathogens.

We already know that the abuse of antibiotics has induced the spread of resistant pathogens, and that as a result we have to use anti-microbial substances very carefully. The defensins in plants and animals are regulated so that they are produced in response to pathogen attack, and resistant pathogens will not easily appear or spread in natural conditions.

However, in Japan this June, genetically modified rice that constantly produces a large amount of a defensin from mustard (*Brassica* sp.) was planted in an isolated paddy field. The developers of this modified rice have stated that they introduced a promoter to strongly express the inserted defensin gene, and that this transgenic rice was resistant to pathogens such as rice blast and white leaf blight. They made sure the gene was expressed in every sample they tested by western blotting method.

Thevissen et al. (2000) have reported that by cultivating yeast with the defensin from dahlia for 2 days, they got resistant strains. From this finding, we can assume that defensin-resistant microbes are likely to soon appear in the paddy field where this transgenic rice is being cultivated.

It is true that the plant defensins are different from animal defensins in their structure, but

microbes can obtain the resistance to both defensins if the mechanism of the action is the same. Therefore, the resistant microbes may be dangerous to human beings. Although studies on the mechanism of action have been intensively carried out by many researchers, it still has not been fully understood.

I have asked the developers to stop this experiment until the knowledge of the mechanism of action is sufficiently developed to discuss the potential danger of resistant microbes. However, the developers denied the possibility of resistant microbes emerging, and they are continuing to grow the rice without any care as regards microbes. The water in the paddy field is being discharged into the surrounding area without any sterilization. They will harvest the seeds of the rice in late September, and plant the seeds again next April.

Microbiologists are able to recognise the danger of resistant microbes more readily than researchers in other fields. This means that some researchers will not be alert to the danger. I think microbiologists should discuss the danger of the abuse of antimicrobial peptides, and give a warning to the scientists who make use of antimicrobial peptides in their research.

With best wishes,
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References

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