

Elevated natural soil metals linked to antibiotic resistance

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(Medical Xpress) -- Soils naturally-rich in heavy metals are contributing to the growing global problem of antibiotic resistance, new research has shown.

Now experts are investigating possible links to past mining activity and the rise in [superbugs](#) in an effort to determine how different [landscapes](#) contribute to increased antibiotic resistance in clinically relevant [organisms](#).

The study by an international team of experts including Newcastle University's Professor David Graham, has found that antibiotic resistant genes, which are among the primary causes of the 'superbug' epidemic, are more prevalent in areas of high metal content.

The research, which is published online today in the Public Library of Science's *PLoS One* journal, involved the examination of soils throughout Scotland and found a strong correlation between the natural levels of metal and the relative resistance genes.

Professor David Graham, based in the School of Civil Engineering and Geosciences, explained: "What we have shown here for the first time is the capacity of the natural environment to differentially contribute to superbugs. Antibiotic resistant genes are more prevalent in soils that are naturally high in [heavy metals](#).

"One implication of this result is that past mining areas, such as

Cornwall with soils rich in tin and copper or Northumberland with its former zinc and lead mines, might have an intrinsically higher potential for antibiotic resistance than elsewhere.”

Dr Charles Knapp from the University of Strathclyde’s Department of Civil Engineering, who led the research, added: “There is a growing concern about [antibiotic resistance](#) in natural and clinical settings and the World Health Organization considers it to be a global problem.

“There is an assumption that improper use of antibiotics is the sole cause of resistance, however, the vast majority of antibiotic resistant genes have originated from the natural environment. Therefore, understanding the factors that influence the levels of these genes is critical to tackling the problem.

“The research provided us with a unique opportunity to examine how geochemical and soil-metal conditions affect the selection and prevalence of resistant genes in nature.

“Our results will aid further surveillance efforts to determine base levels of resistance and with our chemical arsenal to battle infections ever decreasing, the findings will help to develop an effective approach to address these environmental factors.”

More information: The paper, "Antibiotic Resistance Gene Abundances Correlate with Metal and Geochemical Conditions in Archived Scottish Soils," has been published in the Public Library of Science’s *PLoS One* journal and can be viewed online

www.plosone.org/article/info

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Provided by Newcastle University

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