Gardner hypothesis refuted ?

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Some years ago in an essay entitled "Why are figures so significant?" Bob Young described the dangers of the "diverted gaze" where figures become the subject of debate instead of issues [1]. A classic case of the diverted gaze has recently been published in the BMJ over the links between childhood cancer and industrial exposure to radiation [2]. This is territory which has been highly contested in recent decades. In one corner is the nuclear industry, anxious to minimise the hazards in case of compensation claims. In the other corner is a motley assembly of concerned citizens, journalists and academics. And the record of the regulatory bodies caught in between (NRPB, ICRP) is not one which has been noted for its dispassionate curiosity about the biological effects of radiation membership of both bodies has been heavily influenced in favour of the industry.

The latest contribution comes from academics in Birmingham and Oxford whose track record has been one of independence from the industry, in collaboration with the NRPB. It is a study which represents a major investment of public and charitable funds, and it claims to refute the so-called "Gardner hypothesis". This hypothesis was formulated by the late Martin Gardner as a result of a major programme of academic research commissioned after journalists from Yorkshire Television had carried out a lengthy investigation to shed light on a concern from which academics in the mid 1980s had averted their gaze, but which was much in the minds of people living around Sellafield: was childhood leukaemia more common among families living and working around the UK's oldest civil nuclear facility?

The Yorkshire TV programme found an excess of childhood leukaemia in the vicinity of the plant, and this was confirmed by Gardner and colleagues in a case-control study [3]. They also found that father's pre-conception exposure to radiation was significantly linked to subsequent childhood leukaemia, and this is now known as the "Gardner hypothesis". This finding was a major blow to the nuclear industry as it implicated the father's reproductive system, and BNFL have gone to considerable lengths to attempt to reassure the workforce at Sellafield that Gardner et al were mistaken.

The latest news from Draper et al that they have refuted the Gardner hypothesis will come as a relief to the industry and also to the workers. But have they? Close examination of the study reveals that all that has been refuted is the existence of a relationship between radiation dose (as recorded by the special radio-sensitive film badges workers are supposed to wear) and childhood cancer. In fact, it is at extremely low levels of exposure that the link is strongest in this study, and it is at this point in the argument that the authors divert their gaze from other issues in the debate. They identify the Gardner hypothesis with a dose-relationship, and in so doing overlook the more challenging notions that (1) there may be no safe dose and that (2) father's pre-conception exposure could produce other untoward consequences such as non-viable offspring.

* Exposure to radiation is only one of a large number of factors associated with being a radiation worker.

* More of a cause produces more of its effect.

* ERGO: Only increased cases among offspring of high-dose radiation workers establishes cause and effect.

The undistributed middle here leaves out the possibility that high-dose workers father smaller families as well as passing on a propensity for childhood cancers.

This is a major collaborative study of records which analyses radiation workers' dose records in conjunction with childhood cancer records. As every scientist - natural and social - knows, studies which rely on records are limited by the type of information stored which in turn is dictated by the purpose for which the records are kept in the first place. This study was looking in one direction - radiation workers exposure - for confirmation of Gardner's findings which are essentially about childhood leukaemias. Their failure to find a relationship is interesting, but certainly doesn't merit the two pages of discussion that follow the wild leap in the logic which confuses the absence of linear association with any association at all. And what's more, it doesn't even provide us with any further information to illuminate the debate. One wonders what on earth led US servicemen in the 1950s to believe that sitting astride nuclear warheads- apparently a practice much favoured - would interfere with their ability to conceive. They must have been listening to some other experts whose interests lay elsewhere.

1. Young R 1978 Why are figures so significant ? The role and the critique of quantification in J Irvine & J Miles (eds) Demystifying Social Statistics Pluto Press London

2. Draper G J, Little M P, Kinlen L J, Bunch K J, Conquest A J, Kendall G M, Kneale G W, Lancashire R J, Muirhead C R, O'Connor C M & Vincent T J Cancer in the offspring of radiation workers: a record linkage study BMJ 1997 315 1181 - 1188

3. Gardner M J, Snee M P, Hall A J, Powell C A, Downes S & Terrell J D Results of case-control study of leukaemia and lymphoma among young people near Sellafield nuclear plant in West Cumbria BMJ 1990 300 423 - 429

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