

Llandrindod Wells
Powys

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Professor Gerry A Thomas
Chair in Molecular Pathology
Department of Surgery & Cancer
Imperial College London,
South Kensington Campus,
London
SW7 2AZ
By email to: geraldine.thomas@imperial.ac.uk

Dear Professor Thomas

In an article about my colleague Professor Chris Busby on page 11 of today's Guardian newspaper you are reported to have said that "radioactive elements do not bind to DNA" and that "[t]his shows how little [Professor Busby] understands about basic radiobiology." I would point out that the affinity of Uranium for DNA phosphate is well known. The affinity of the uranyl ion, UO_2^{++} for Calcium Ca^{++} sites was known in the 1960s when the substance began to be employed as an electron microscope stain. The affinity constant was measured by Nielsen et al in 1992 and was of the order of $10^{10}M^{-1}$ which would suggest, in mass-action equilibrium terms, that at quite low concentrations (100ng/l) there is a significant amount of Uranium bound to the phosphate backbone of the DNA. Strontium is reported to bind to chromosomes (Steffensen and LaChance 1960, Mazia 1954).

The article reports you as describing as "ludicrous" Professor Busby's statements about heart disease caused by Caesium. However, research after the Chernobyl disaster shows that abnormalities of cardiac rhythm and conductivity correlated with the quantity of incorporated radionuclides (Bandazhevsky 1999). The incidence and persistence of abnormalities of cardiac rhythm were significantly higher in ischemic heart disease patients from contaminated territories (Arynychyna and Mil'kmanovich, 1992).

[Addendum emailed to Prof. Thomas after the first version of my letter was sent: It has been pointed out to me that the drafting of my second paragraph may suggest equivocation about the role of Caesium. For the avoidance of doubt please let me add that Professor Bandashevsky's presentation to the 2009 Conference of the ECRR (ECRR 2011) makes it clear that Caesium 137 is the isotope of interest. For example, with increasing concentrations of Cs-137 there is a consistent and dramatic increase in the proportion of children with ECG modifications. The effects are apparent at Cs-137 levels as low as 12 Becquerels per Kilogram.]

You are reported to have said that none of the products referred to in the article is useful. I will leave aside consideration of testing for radioactivity since it is clear that their usefulness is a matter for purchasers, but with reference to the mineral supplements I would point out that research was conducted in the 1950s and '60s when the presence of Strontium-90 in weapons test fallout was a matter of political and scientific concern. Various papers showed that administration of stable Calcium and Strontium blocks the absorption of Strontium-90 and other radioactive Calcium mimics. Spencer et al 1967 showed the method worked in human beings; Palmer et al 1958 and Kawin 1959 demonstrated that it worked in rats. It therefore appears that all

your statements, which have certainly caused distress and quite possibly reputational damage, are seriously in error. It is possible that you have been misreported and if that is the case I request you to communicate with the editors of the Guardian and ask for a correction to be printed. If you have not been misreported please would you ask the editors to print a retraction and please also let me have a letter or an email of apology that I can forward to Professor Busby who is presently out of the country. In a spirit of openness and scientific inquiry I also invite you to convene a public meeting in Imperial College where you could debate these issues with Professor Busby. Such an event would rapidly show that your alleged claim about his understanding of basic radiobiology is very far from true.

I am copying this letter by post to the Chief Executive of Imperial College.

Yours sincerely

Richard Bramhall

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c.c. Mark Davies, Chief Executive's Office, St Mary's Hospital, The Bays, South Wharf Road, London W2 1NY