

RFID



RFID & Public Health

Is there a cause for concern?

*CoreRFID's views on the **safety of RFID tags and readers** – advice to users.*

As the use of RFID grows people very naturally ask the question, "Is it safe?" A simplistic response might be "so far so good" but what is the current state of understanding of the potential risks in wide-scale deployment of RFID technology?

In this short summary, CoreRFID provides an overview of the issues and of some of the findings so far.

Research Into Health Issues

Questions have been asked about health issues related to the use of RFID. In broad terms these have focused on three main areas:

- Is there a risk to users of readers, users of tags or those in the immediate area from the radiation used to exchange data between the tag and the reader?
- Is there risk associated with humans injecting implantable tags beneath the skin?
- Is there a risk to patient from using tags in a medical environment for patient identification or other applications?

Research has been limited to date, and findings in relation to healthcare have been largely limited to assessing the suitability of RFID for use in hospital environments or to its use in animal tagging applications. These findings may have only limited significance but nevertheless are worth examining.

The risks to public health associated with RFID were evaluated by the International Commission on Non-Ionizing Radiation Protection (the body that monitors research in this area) as part of its advice to the European Commission on the risks to the public of devices using electromagnetic fields.

The risks associated with injectable RFID tags have been most fully evaluated by the British Veterinary Association and by the American Veterinary Medical Association. In 2008 concerns were raised over the possibility that injectable RFID tags could be linked to the development of cancerous tumours. However there has been almost no evidence of this occurring outside the laboratory in spite of over ten million animals having been tagged in this way in the UK and the USA. (The particular study noted the incidence of tumours occurring in mice that had been injected with microchips.) The use of injectable RFID chips in humans was approved by the American Food & Drug Administration in 2004 and the FDA have made no move to change the status of this approval in spite of the introduction of new technologies. US consumer groups have campaigned against the use of injectable tags in humans and have alleged that the FDA did not consider all the available research.



Do RFID systems present a health hazard?

using electromagnetic fields.

In the area of patient risk associated with the use of RFID in clinical environments, the limited number of studies have had mixed results. In a study¹ published in the Journal of the American Medical Association, an RFID reader and tags were demonstrated to have interfered with other equipment but industry commentators have suggested that the study failed to use real-world situations and used equipment that did not conform to legal power limits. More recent work² by the US Food & Drug Administration has shown that there is a risk of interference between RFID readers (especially low frequency and high frequency readers) and implantable pacemakers and defibrillators although the FDA admits that it has received no instances of real world incidents and concludes that the current situation does not present an urgent public health risk.

In October 2008, AIM (the Association for Automatic Identification & Mobility) announced that their RFID Expert Group was to develop test protocols for RFID devices to ensure that they have only a benign effect in a healthcare setting. Working with three American universities, AIM expected to enable testing of devices with these protocols to begin by October 2009.

Consultation & Recommendations

In 2002 the International Commission on Non-Ionizing Radiation Protection provided advice³ to the European Commission on the risks to the public of a range of radiation sources (including RFID). This advice was incorporated in an EU Directive⁴ to member states in 2004.

In summary the advice concluded that, in relation to the frequency and power levels associated with RFID devices that, while there was no indication of any health hazard, "there is a need to collect exposure data about RFID systems". The advice identified three areas of potential interaction between electro-magnetic devices and biological systems; heating, membrane stimulation and electroporation. The effects are summarised below.

| Heating | Membrane Stimulation | Electroporation |
|--|--|------------------------------------|
| Thermal damage would require high field strengths. | None – frequencies of RFID devices are too high to cause this. | Not relevant to everyday exposure. |

The ICNIRP stated that "RFID fields will produce no heating and no thermo regulation stress".

EU directive 2004/04 provides guidance on the minimum health and safety requirements to be followed by employers. This guidance recognises that there is "no conclusive scientific evidence establishing a causal relationship" of long-term effects due to exposure to time varying electric, magnetic and electromagnetic fields but proposes "a minimum basis of protection for all community workers". The guidance provided in the Directive says that employers should assess and, if necessary, measure the fields to which workers are exposed. The guidance specifies exposure level limits. For RFID frequencies this is a specific absorption rate of 0.4 watts per kilogram measured at the whole body level. Power output from RFID readers is less than 2 watts (33 dBm), giving a maximum exposure of around for someone weighing 63 kilos (10 stone or 140 pounds) of less than one tenth of the limit.

Obviously anyone planning to implement technology should take account of the risks involved to workers and to the public at large but, on the evidence currently available, CoreRFID believes that there are no real health risks associated with the use of RFID for most general purpose applications. If systems are to require continuous reading of tags then care should be taken to ensure that the exposure of staff to radiation is assessed.

(All information correct, to the best of our knowledge, as at January 11th, 2010)

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¹ Electromagnetic Interference From Radio Frequency Identification Inducing Potentially Hazardous Incidents in Critical Care Medical Equipment, van der Togt et al, AMA 2008

² In vitro tests reveal sample radiofrequency identification readers inducing clinically significant electromagnetic interference to implantable pacemakers and implantable cardioverter-defibrillators, Seidman et al, Heart Rythm, Vol 7 No 1, January 2010

³ Possible Health Risks to the General Public from the Use of Security & Similar Devices, ICNIRP, 2002

⁴ Directive 2004/40/EC on the minimum health and safety requirements regarding exposure of workers to the risks arising from physical agents (magnetic fields), OJEU, May 2004