



Mast and Tower Safety Group

promoting safety and best practice

Guidance Note

GN-004

Guidance for Doctors in the Assessment and Acute Treatment of a Patient Suspected of Over-exposure to Radio Frequency Radiation



MATS Group Guidance Note

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1 Introduction

This guidance, which has been prepared by a group of Occupational Physicians, gives advice on the known adverse health effects of short-term (minutes to a few hours) exposure to a source of high intensity radio frequency (RF) emissions. Such workplace exposures are both uncommon and accidental and may be reportable by the employer under the Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 1995 (RIDDOR regulations).

Attached to this guidance you will find a pro-forma to assist in your assessment.

2 How do radio frequency emissions affect the body acutely?

Human exposure to electro-magnetic frequencies (EMFs) can produce well-established symptoms and acute biological effects which can vary according to the frequency of the radiation. RF emissions are in the range 100 kHz to 300 GHz (called microwaves above 300 MHz) and fall into the non-ionising part of the electromagnetic spectrum. They cannot disrupt a chemical bond in the way that ionising radiation can. At frequencies above 100 kHz, especially those in the radiofrequency and microwave region (>300 MHz) heating of internal parts of the body as well as localised tissue heating can occur leading to a rise in temperature. At the highest (GHz) frequencies, the heating effects are restricted to the body surface. The heating effect normally prompts the exposed person to take avoiding action.

The established adverse health effects (those effects for which there is conclusive evidence) arise directly from over-heating of the body.

Overheating effects can occur in three ways:

- If a large part of the body is exposed whole body warming can occur and may overwhelm heat loss mechanisms such as dilatation of peripheral blood vessels resulting in a rise in body temperature and hyperthermia
- Localised overheating can occur but unlike thermal burns there can be greater heating of the tissues beneath the skin than of the skin itself. Deep seated tissue burns can therefore arise
- Direct thermal burns can occur if the exposed individual is in contact with a metal object such as a bracelet which is also exposed. Metallic objects absorb more RF energy and heat up quickly.

Case reports of patients acutely exposed to RF have also described a variety of other symptoms, especially headache and bowel upset. The causal mechanism for these reported symptoms is not, as yet, understood. Apart from heating, documented information on the effects of acute exposure is scanty, resulting in no properly established basis on which to understand any pathology or symptoms which occur. However, from a physiological point of view, exposure insufficient to cause significant heating of the body is also unlikely to cause any effect.

In general, demonstrable physical injury only occurs following extreme exposure especially where the individual is unable to move away. There are no known long-term adverse health effects other than those arising from any heating effects. Rarely symptoms such as headaches and diarrhoea do persist and in that unlikely event further advice should be taken from an Occupational Physician.

3 Anxiety

The situation leading to the accidental exposure may itself have caused a lot of anxiety. In addition concern about exposure to 'radiation' may also cause anxiety because of the unseen, and hard to sense, nature of the situation, which will commonly have occurred outside the individual's control.

Further anxiety about possible long-term adverse health effects may also add to the worry that an individual feels.

4 History and Examination

The attached pro-forma is self explanatory and intended to act not only as a guide for Doctors, but also to allow structured information to be gathered and eventually collated and evaluated in order to give a better understanding of adverse health effects arising from acute exposure to RF. You are therefore particularly encouraged to use this pro-forma.

5 Investigations

Investigations should usually be undertaken only on the basis of clinical findings.

There are no specific investigations that should be undertaken following exposure to RF. If there have been burns or hyperthermia, a routine full blood count, urea and electrolytes, and liver function tests are usually part of the standard investigations. There is no evidence that RF exposure causes these parameters to alter.

6 Treatment

Treatment will depend upon clinical findings.

- Burns should be treated conventionally - if severe, a plastic surgeon should be consulted
- Hyperthermia should be treated using simple measures to cool the individual, such as cool drinks and resting in a cool, well-ventilated room
- Anxiety arising directly from the incident causing the RF exposure, and indirectly from worry concerning any after effects of RF exposure should be actively assessed and reassurance given appropriately.

Under hydration may occur in riggers who have no opportunity to take fluids at work. Plenty of cool drinks should be encouraged for all patients to ensure normal hydration and help to relieve the symptom of dry mouth which anxiety induces.

Actual injury following RF exposure is rare in the reported literature. The reassurance of a medical assessment is important in helping allay the natural anxiety of somebody who has been accidentally exposed.

7 Follow-up

Burns or hyperthermia should be followed up by a clinician with appropriate expertise depending upon their severity.

Other patients should ideally be followed up on a symptomatic basis. This may best be undertaken by their own GP. Assessment by an Occupational Health Physician at their place of work is also strongly encouraged. This will allow an opportunity to build a knowledge base of any symptoms which last beyond the day of exposure; and may thus allow a better understanding of any hitherto inadequately understood consequences of short-term over-exposure.

8 Clinical Assessment Pro-forma

Please use this pro-forma - it helps structure your assessment, is useful at follow up and it is anticipated that data will be collated as a part of a UK programme to learn more about RF over exposure and its prevention.

9 Acknowledgements

This guidance was prepared by a working group of Occupational Physicians.

The membership of the Group was

- Dr Ian Torrance (Consultant Occupational Physician), Chair
- Dr John Gratton (Director Occupational Health, Praxis 42)
- Dr David Holt (Consultant Occupational Physician, Institute of Naval Medicine)
- Dr Paul Litchfield (Chief Medical Officer, British Telecommunications)
- Dr Simon Ridout (Consultant Occupational Physician, Devonport Royal Dockyard)
- Dr Chris Schilling (Consultant Occupational Physician, Schilling and Schilling).

Helpful comments were received from the Health and Safety Executive during the preparation of this guidance.

10 Related documents

- MATS Group Guidance Note GN-002 – Documenting a company RF policy
- MATS Group Guidance Note GN-009 – First Aid Guidance

The information in this document does not absolve contractors or suppliers from their responsibility to identify and comply with all relevant legislation, regulations and legal standards nor does it take precedence over laws, regulations and external standards.

Clinical assessment – Proforma for Suspected Radio Frequency Over-exposure

Patient Details

Date:

Name:

Address:

D.O.B.

History *(Please give a general description of what happened)*

Did the patient feel a sense of warmth?

If so, where?

And, how long for?

Was any part of the body in direct contact with the RF transmitter?

If so, which part?

And, for how long?

Was there any direct contact with any hot metallic object?

Is the patient on any medication - please list

Does the patient complain of any of the following?

Nausea

Vomiting

Diarrhoea

Palpitation

Headache

Eye symptoms (e.g. lacrimation, pain)

Have any symptomatic treatments been given already?

Examination

General description (e.g. calm, anxious) and any other significant general observations.

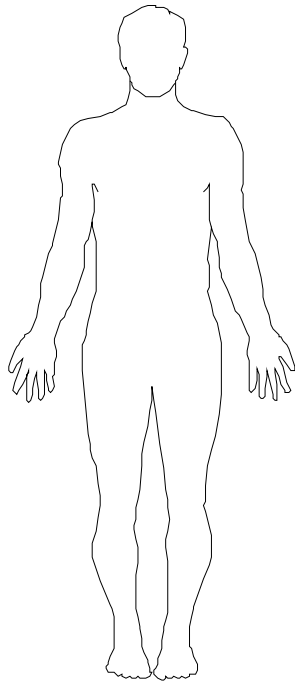
What is the patient's

Temperature?

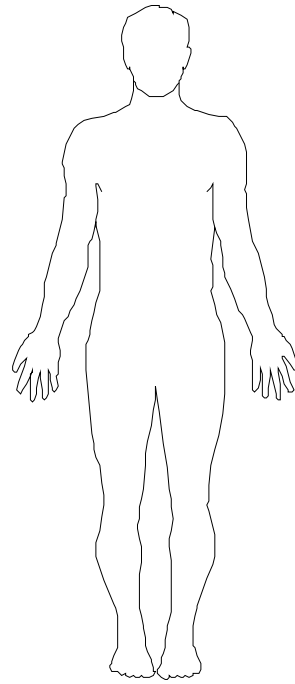
Pulse rate?

Blood pressure?

Are there any burns to the skin or any areas of erythema? - Please describe, or illustrate on the diagrams:



Anterior



Posterior

Treatment given

Signature of Clinician completing this form:

Name of Clinician completing this form:

Phone number/contact point of hospital where this form was completed:

Please would you give a photocopy of the completed form directly to the patient and ask him/her to give it to their company Occupational Physician who will normally arrange to follow up each patient.