

## Bhabha Atomic Research Centre

### Frequently Asked Questions: Radiation Exposure & Effects

Sl. No	QUESTIONS	ANSWERS
1	What is the cumulative effective dose (dose rate in Sv) for permanent sterility on testis?	The effective dose for acute exposure (whole body/gonadal exposure (testis)) likely to cause permanent sterility is <sup>3</sup> 6 Sv. Cumulative dose required may be even more since it will involve fractionated or chronic exposure as the case may be. Permanent sterility will occur if this dose to both testis is delivered in < 1 day.
2	What is the cumulative effective dose for permanent sterility on male sexual impotency?	There are several reasons for sexual impotency. These include diabetes, hypertension, drugs, smoking, chronic alcoholism, varied psychological factors, injury to spinal cord etc. Impotence refers only to sexual performance and not infertility. Causes such as vasculitis and vascular insufficiency in any form on permanent basis would require radiation exposure of the order of 15 Sv or above.
3.	List the names of casual labours who has been overexposed to Nuclear Radiation	No case of Casual Labourer has been reported to have been over exposed.
4.	List the names of contractors companies who are assigned to Radiation job/work.	No contractors are employed in radiation work.
5..	What is the cumulative effective dose for permanent sterility on eyes?	There is no such thing as permanent sterility of eyes. Acute gamma ray exposure in the region of 2.5 to 4 Gy may induce lenticular opacity (cataract).
6	Whether chances of blood cancer are likely to overexposed persons later in life and if “yes” what are the precautions to be taken to cure the diagnosis?	As per the scientific information available in literature the induction period for blood cancer following radiation exposure is 2 to 7 years. This is purely a probabilistic phenomenon. The probability of induction of blood cancer of any type depends on dose received. An acute dose of 1 Gy (1000 mGy) may cause an increase of 4% in incidence of cancer in occupational workers in their life time over and above natural occurrence of cancer (all types of cancer).
7	Which part of the body is most likely	It is the bone marrow and the process of

	to be effected on overexposure by a highly radioactive source on wholebody mention the organ?	hematopoiesis (formation of various cell types in the blood).
8.	Whether any worker/Labour/Employee has died due to highly overexposure of nuclear radiation in BARC.	No person working in BARC has died to overexposure of Nuclear radiation.
9	What about Health Hazards for Radiation workers? Who are overexposed to nuclear radiation, and radioactive isotopes?	Health hazards to radiation workers (occupational) have been extensively documented in the reports of the United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR). These are available on the website <a href="http://unscear.org">http://unscear.org</a> . There are also strict radiation protection and surveillance programmes instituted at various units in DAE. These follow the directions of National Regulatory Board (AERB) which are consistent with international radiation protection standards laid down by International Commission on Radiological Protection.
10	Whether any annual medical checkup of staff was held? What are the findings of such medical checkup?	<p>Periodical medical check-up is conducted in BARC Hospital for all categories of employees, who work in different areas, like laboratories, service sectors, construction, maintenance, administration, security etc. During the period from 01.09.2009 to 31.08.2010, 3219 persons' have undergone the health check-up and some of the employees were found to have the following health problems:</p> <ul style="list-style-type: none"> <li>a. 95 persons with respiratory problems</li> <li>b. 6 persons with liver related illness</li> <li>c. No case of illness due various forms of radiation exposure</li> </ul>

Sl. No	QUESTIONS	ANSWERS
1	Whether there are guidelines that are applicable to be implemented in administration of radioactive Iodine in Hyperthyroidism cases.	Yes. There are quite well established guidelines for administration of radioactive iodine (I-131) therapy for hyperthyroidism cases. These guidelines were issued by the Society of Nuclear Medicine, USA (SNM), and the European Association of Nuclear Medicine (EANM). These are quite comprehensive and are being followed world over including our Centre. These guidelines are to be interpreted in the appropriate clinical context and logically.
2.	Whether there guidelines are available free or for a price to Public	Yes. Both the guideline documents are available for the public and can be downloaded from the websites of the Society of Nuclear Medicine, USA, and the European Association of Nuclear Medicine which are indicated below: <ol style="list-style-type: none"> <li>1. <a href="http://interactive.snm.org/docs">http://interactive.snm.org/docs</a></li> <li>2. <a href="http://www.snm.org.tw/Guideline">http://www.snm.org.tw/Guideline</a></li> </ol>
3.	Whether patients required to be admitted in Hospital before administering radioactive Iodine.	In India, as per the Atomic Energy Regulatory Board (AERB) guidelines, patients to be treated with radioactive iodine (I-131) need to be admitted in an isolation ward in a specialized hospital only if the radioactive field is greater or equal to 5 mR/hr at a 1 meter distance from the patient. The usual dose of radioactive iodine administered in a single sitting is about 5-10 mCi (variable from centre to centre). After the administration of 5-10 mCi to the patient, the field is less than 3mR/hr at a 1 meter distance. Hence, I-131 therapy for patients of hyperthyroidism is usually carried out as an outpatient procedure the world over including our Centre.
4.	What are the measures taken by BARC administration pertaining to the health of an employee working in BARC (Trombay Campus) with a specific emphasis on hazards posed and preventive health measure?	<p>BARC has a Contributory Health Services Scheme (CHSS) which has 3-levels of health care provisions. All the employees are part of CHSS.</p> <p>Primary level : Zonal Dispensaries  Secondary level: BARC Hospital (BARCH)  Tertiary level : Referral Hospitals for super specialty care  BARCH's Trombay Dispensary provides Occupational Health (OH) services to all the employees working in BARC premises.</p> <ol style="list-style-type: none"> <li>1. Routine health care is also provided.</li> <li>2. Periodic medical examination.</li> </ol> <p>: Once in 3 years for classified workers [Ref. Radiation Protection Rules, 2004]  : All other radiation workers are examined once in 5 years</p>

		<p>and records are maintained.</p> <ol style="list-style-type: none"> <li>1. Medical examination for workers involved in hazardous operations as given in Atomic Energy (Factories) Rules. [Schedules under Rule 88 of AEFR 1996].</li> <li>2. From now onwards apart from annual medical examination in respect of the above clause, all employees would be subjected to medical examination every 3 years.</li> </ol> <p>In collaboration with Industrial Hygiene Safety Section (IHSS), Radiation Safety System Division (RSSD), Trombay Dispensary, Medical Division conducts Hearing Conservation Programme for the benefit of employees who work in potentially high noise level areas.</p>
5..	What are the various welfare activities done by BARC for its employees?	The following welfare activities done by BARC for its employees :

<b>Sl. No.</b>	<b>Scheme/ Facility</b>	<b>Object</b>
1.	A crèche facility known as 'KILBIL' situated at Anushaktinagar.	Setup for quality care, based on modern scientific and professional principles, to children of the DAE employees, especially in those cases where both the parents are working in Mumbai based DAE units.
2.	'Sausheelya' at Anushaktinagar, Mumbai	For imparting special education developing suitable skills through vocational training and providing guidance in rehabilitation of mentally challenged dependents of the DAE employees residing at Anushaktinagar.
<b>The following welfare activities done by BARC for its employees which are run on Grant-in-Aid received from Government :</b>		
<b>Sl. No.</b>	<b>Scheme/ Facility</b>	<b>Object</b>
1.	BARC Benevolent Fund	To provide assistance in case of sickness, hardship or distress and to carry out measures for general welfare, and all other activities incidental to these, for the benefit of eligible members of the fund with particular emphasis to education of children.
2.	BARC Employees Family Relief Scheme	To give monetary assistance to (a) the nominee of a member of the scheme dying while in service (b) a member of the scheme himself who is permanently incapacitated to earn his livelihood while in service.
3.	BARC Staff Club	For promotion of activities related to sports, recreation, adventure, nature, literature & culture among its members and carrying out all such other lawful activities as are incidental to the attainment of the above mentioned objectives provided they are neither political nor religious in nature.
4.	Departmental Canteens	The BARC has set up departmental canteens at various locations for the benefit of its employees at concessional rates.
5.	Transport	Free Departmental Transport facilities provided to the employees to commute from residence to office and back.
6.	Other welfare measures like Leave, Pension, CGEGIS, Holidays, P/F, CEA, Government Quarters, LTC, incentives for promoting Small Family Norms, Immediate relief to the family of an employee who dies while in service, compassionate appointments in deserving cases, PRIS etc. are extended as per Government Rules.	