Bundesamt für Strahlenschutz

In-vivo measurements in Germany in the wake of Fukushima

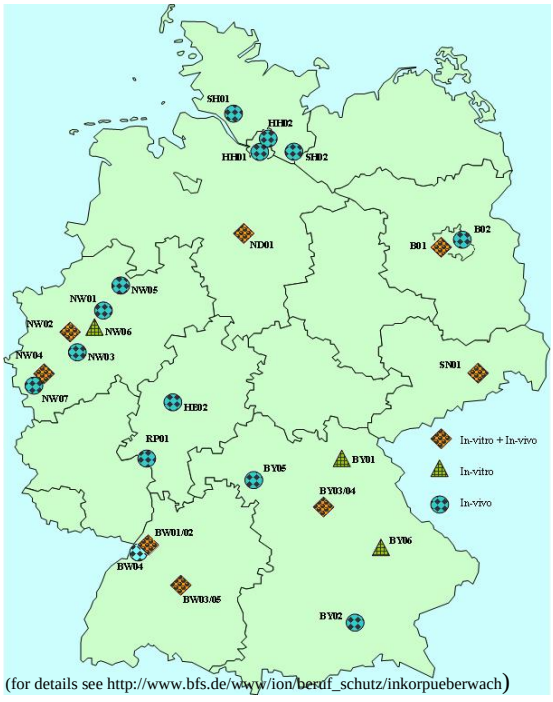
U. C. Gerstmann*, B. Breustedt, W. Buchholz, W. Eschner, L. Geworski, P. Hill, K.-D. Keller, M. Kriens, M. Lassmann, W. Lieberz, D. Löhnert, S. Löscher, J. Mester, N. Neudert, G. Niggemann, D. Noßke, M. Schreckenberger, W. Sonnenschein, T. Spross

Introduction

German citizens and other people being potentially exposed to radionuclides released by the accident at the nuclear power plant Fukushima Daiji had the possibility to undergo an assessment of their body burdens at most of the German approved laboratories for incorporation monitoring (mostly) free of charge. A map with the locations of the laboratories is shown in Figure 1.

The Coordinating Office on Incorporation Monitoring of the German Federal Office for Radiation Protection collected the results made available by the laboratories. Till the end of the year 2011, the 19 involved in-vivo laboratories in total reported on 358 measurements. Most measurement results were below limit of detection. Only in 75 cases measurable activities showed up for at least one nuclide.

For dose calculations for measurements performed in March 2011 an acute intake by inhalation at the time of the accident was assumed, for later measurements a chronic intake by ingestion starting at the time of the accident was assumed.

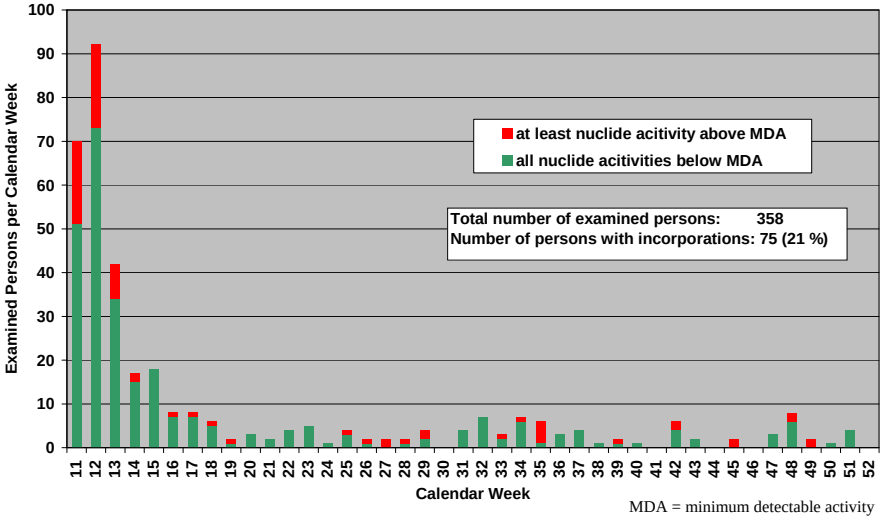


(for details see http://www.bfs.de/www/ion/beruf_schutz/inkorpueberwach)

Figure 1: The German Network of Approved Laboratories for Incorporation Monitoring

Results

Figure 2 shows the timeline of the number of persons examined per week in 2011. After two weeks the number of persons decreased rapidly. In 75 out of 358 persons at least one radionuclide released by the accident could be determined. Table 1 summarizes the highest activities found in the thyroid and whole body.



MDA = minimum detectable activity

Figure 2: Timeline of the number of examined persons (with and without incorporation) in Germany in the year 2011

Table 1: Maximum Activities (Bq) in Thyroid and Whole Body

	I-131	Te-132	Cs-134	Cs-137
Thyroid	500	-	-	-
Whole Body	980	410	640	580

In most cases, the estimated effective dose was below 0.1 mSv. The highest effective dose was about 0.5 mSv. In comparison, the external dose to be received on a flight from Europe to Japan and return is about 0.13 mSv (calculated with EPCARD) [1]. In Germany, the mean annual effective dose from natural sources of radiation is 2.1 mSv [2]. In summary the observed incorporations did not constitute a radiological threat.

[1] European Program Package for the Calculation of Aviation Route Doses (EPCARD); http://www.helmholtz-muenchen.de/epcard-portal/
[2] BMU, Umweltradioaktivität und Strahlenbelastung: Unterrichtung durch die Bundesregierung im Jahr 2009 (Parlamentsbericht), Berlin/Bonn, März 2011

* corresponding author (ugerstmann@bfs.de, Phone +49-30-18333-2430)