

Chernobyl: how solutions were found in Belarus to remedy the lack of available scientific information

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Abstract

It is demonstrated that the Republic of Belarus is the country most affected by the Chernobyl catastrophe, so research on its medical consequences is vital for Belarusians. However, the success of the research was hampered by the lack of available scientific information caused by the unique character of radiation exposure that prevented an uncritical 'mechanical' use of known models of radiation health effects and the absence of reliable data on the doses of acute exposure; the shortage of the knowledge in radiology possessed by clinical medicine specialists; scientific and mass media Chernobyl-related censorship till 1989; the absence of sufficient epidemiological background; postponed and inadequate reaction of the USSR scientific information institutions to the event; the recent loss of access to the information provided by these institutions that became Russian property after the break up of the USSR. The challenge was accepted by enthusiasts who created domestic databases. Four projects, each possessing its own unique features are described. It is argued that the prerequisite for successful development of these projects is international collaboration.

Effects of Chernobyl on the Republic of Belarus

Before examining the Chernobyl-related information problems in Belarus, it seems reasonable to remind the reader that:

- ◆ 59.9% of that area of the former USSR which has a level of radioactive contamination at 137 Cs of 15-40 Ci/sq. km and 69.9% at the level of contamination at 137 Cs of over 40 Ci/sq. km is situated in the Republic of Belarus (1);
- ◆ 20% of the whole area of the Republic of Belarus is considered to be radionuclide-contaminated due to the Chernobyl catastrophe (including 18% of arable land, 20% of forests and over 3,000 settlements) (2);

- ◆ 2.2 million people live in these contaminated areas of Belarus, i.e. almost a quarter of the entire population of the country (2). The analogous proportions for the Ukraine and Russia are 1/30 and 1/200 (3);
- ◆ the calculated life-long dose of exposure on the bone marrow of an average exposed inhabitant of Belarus is 8.8 mSv as compared with 2.8 mSv for an exposed inhabitant of the Ukraine, and 1.0 mSv for Russia (4).

The above examples seem to be quite enough to conclude that the Republic of Belarus is the greatest 'victim country' of Chernobyl. So, Chernobyl-related information problems in Belarus are of vital importance.

The general information problems for Belarusian researchers

The lack of scientific information possessed by Belarusian researchers involved in the studies of the Chernobyl nuclear power plant accident health hazards seems to be inevitable, for the following reasons directly or indirectly attributed to the catastrophe, e.g.:

- ◆ the unique character of radiation exposure, caused by the Chernobyl accident that made any uncritical or 'mechanical' use of known models of radiation health effects useless for predicting accurately the radiation effects of Chernobyl;
- ◆ the shortage of knowledge in radiobiology possessed by clinical medicine scientists;
- ◆ the absence of reliable data on the doses of acute exposure;
- ◆ scientific and mass media censorship (5) of Chernobyl-related information which blocked the normal dissemination of Belarusian Chernobyl-related research findings between 1986 and 1989;
- ◆ the absence of sufficient epidemiological research backgrounds in Belarus;
- ◆ postponed and inadequate reactions of the scientific information institutions of the USSR to the event.

These specifically Chernobyl-related issues were complicated by the general problems of information support for scientific research in Belarus. The latter are associated with the decay of the USSR and the consequent loss by Belarusian scientists of access to the USSR State System for Scientific and Technical Information, which became Russia's property (not the common property of other former Soviet states); and with the inadequate development of facilities for electronic access to western scientific information in Belarus.

World Chernobyl-related documentary information flows and access for Belarusian researchers

It is important to know if the thematic scattering of world Chernobyl-related scientific documentary information flows (DIFs) is really so extreme or it just seems to be so because of the above reasons. (By the Chernobyl-related scientific DIFs we mean the ones that are relevant for the fulfilment of the various studies of medical after-effects of Chernobyl). The answer to this question, as well as revealing any specific features of world Chernobyl-related DIFs and assessing the sufficiency of Belarusian library stocks relevant to the problem, may be helpful for the improvement of scientific information support to such studies.

The study described below is very much a case study. It was not possible to design a more representative survey of Chernobyl-related DIFs because of the above-mentioned problems of access to the totality of the world's information. Therefore, all we could manage to arrange was the analysis of the DIFs in Chernobyl-related subjects, as follows:

- ◆ assessment of incorporated radiation doses (A);
- ◆ leukaemia treatment and prognostication of leukaemia development (L);
- ◆ morphological and functional state of the haematopoietic system under radiation exposure (M).

We sorted and studied the relevant abstracts, disseminated during seven months in 1990-91, by a computerized scientific information system (the Latvian one, which is unfortunately not available to us any more) that processed all the All-Union Institute of Scientific and Technical Information databases, disciplinary, as well as geographical, language and species structures of DIFs in these three case subjects. We also estimated the 'quotas' of references in journal papers per an average paper of each collection (6, 7) and counted the number of journals from which papers were abstracted. The disciplinary orientation of the abstracts was determined according to the names of a database containing them and the thematic scattering of DIFs was estimated according to the number of disciplinary-oriented databases reflecting an actual DIF. The number of cited references was taken from the abstracts.

The results of the studies of Chernobyl-related DIFs (A, L and M) structure are plotted in Table 1, on the next page.


We consider the DIFs' thematic scattering to be too high, especially for the topic A. Such a large number of related disciplines is more natural when the scattering of cited literature is under study because the process of information consumption seems to be inevitably more interdisciplinary in its nature than the process of 'classification scattering' itself. (Compare, for example, with our data (8-11) of  documentary information flows in these narrow margins

TABLE 1
Characteristics of world's DIFs structure
in topics A, L and M

Subject	DS	GS	LS	SS	JN	RQ
A	27	36	14	51.68/17.20	121	13.61/56.68
L	19	33	19	92.3/0	305	16.97/45.35
M	21	20	7	80.0/12	52	13.61/49.11

DS: disciplinary structure in terms of number of disciplinary-oriented databases;
 GS: geographical structure in terms of number of countries of the origin of the study;
 LS: language structure in terms of number of languages of publication;
 SS: species structure in terms of parts of journal papers/conference abstracts, %;
 JN: number of source journal titles;
 RQ: reference quotas in an average non-review/review paper, %.

and processing and in magnetic fluids and their medical applications). Therefore, we think that research libraries and information services should pay special attention to this problem, trying to deliver complete information retrieval from all possible sources and not concentrating only on specialized databases.

At the same time, nothing very special was found about the geographical and language structure of DIFs (though, the number of countries where the research work on topic A is being carried out seems possibly significant). The species structure is, however, rather significant. On the one hand, the unusually large proportion of conference abstracts on the assessment of incorporated radiation doses might indicate an 'outburst' of research activity in this area since the first results are normally published in this form (9). On the other hand, the species structure of the DIF on leukaemia, with the enormous prevalence of journal articles, is characteristic of a very stable development of a scientific branch not influenced by any urgent problems. (As stated in (12), the epidemiological findings of post-Chernobyl childhood leukaemia incidence rates proves that no expected increase of radiation-induced leukaemia has appeared so far, so it might be possible that we put too much 'Chernobyl status' to the topic L). As for the reference 'quotas', taking into account the results of Price's studies (6, 7), we come to a conclusion that the best-grounded recent studies (out of those taken into account) are the ones for L and the best-grounded review are on A. It is known that in non-humanities subjects the greater number of references (within

the range of 15 to 22 references in an average non-review paper from a collection) correlates with a potentially higher scientific value of the collection under study (9).

We have also undertaken a study of the holdings of the world's biomedical journals in library stocks in Belarus (13). The results demonstrated that these holdings are absolutely insufficient (13). Having two to three journals in a discipline (as the Republican Scientific Medical Library does) is utterly negligible, especially if these journals are not of the top quality. Immunology and oncology (the biomedical discipline with the most documentary information scattering (14)) are ridiculously badly represented in the stocks. This is especially dramatic in the Chernobyl context, in which these disciplines play an even more important role.

So, there are some indications of an 'outburst' of information, devoted to Chernobyl-related medical problems: even from a bibliometric viewpoint (not just from common sense) it can be seen in the impressive thematic scattering in some of the Chernobyl-related DIFs. At the same time, medical scientists in Belarus suffer from 'information hunger' not only for the reasons featured in the introduction to this paper, but also because of the insufficiency of the Belarusian library stocks.

Domestic specialized databases

A number of enthusiasts accepted the challenge of solving the problem of access to relevant Chernobyl-related literature through creating domestic databases. A description of these follows.

Chernobyllit

The *Chernobyllit* database was created by a team from the Research Institute of Oncology of the Health Protection Ministry of the Republic of Belarus. It is a database that reflects world literature on all the aspects of radiation effects on human beings and animals and on Chernobyl-related medical and biological research. Its basic sources are fifteen discipline-oriented databases of the All-Union Institute for Scientific and Technical Information (since 1991: All-Russia Institute; the Russian abbreviation is VINITI). These represent almost half of the existing VINITI discipline-oriented databases. It was originally designed to overcome the so-called 'classification scattering' of the relevant abstracts in numerous abstracting journals of VINITI and thus make information retrieval more convenient, simpler and faster. The *Chernobyllit* database is the only database in Belarus that reflects relevant world-wide documentary information flows. This is due to the long-established relations of its creators with VINITI. This type of collaboration is now unfortunately an extremely complicated business for the rest of Belarusian institutions because VINITI is very much a 'foreign' institution for Belarusians since 1991.

However, since it is known that Chernobyl-related scientific documents may be contained in up to 27 VINITI databases, the completeness of *Chernobyllit* in terms of world literature is only relative. It is the best one in the country, but it is not ideal. It has over 30,000 abstracts of documents published since 1986. The language is Russian.

Chernobyllit was created within the framework of an R & D project for local database creation, replenishment and development supported by the Health Protection Ministry. The major users are the researchers of the Research Institute of Oncology. Availability to non-institutional users is free of charge, offline. Online access is not offered due to financial difficulties.

Abstracts of Belarusian, Russian and Ukrainian literature

A database called *Medical aspects of the Chernobyl nuclear power plant disaster* has been created by the Department of the Health Protection Information Support of the Centre of Medical Technologies, Informatics, Management and Economics of Health of the Belarusian Health Protection Ministry. It is located at the Republican Scientific Medical Library (RSML). This abstracting database covers mainly Belarusian, Ukrainian and Russian literature, does it far more completely than *Chernobyllit* and has more detail. The following major subjects are dealt with:

- ◆ general problems of radiation medicine;
- ◆ medical aspects of nuclear power plant disasters, including radionuclides in food, state of health of the exposed population and the 'liquidators' (Chernobyl clean-up emergency workers), received doses, mechanisms of radionuclide effects on the human organism, medical and technical measures for overcoming the Chernobyl disaster consequences, radiation protection etc;
- ◆ clinical aspects of radiation effects on a human being, postponed effects of ionising radiation (psychiatric, oncological, genetic, hereditary and congenital disorders), prophylactics and therapy, radioprotectors, assessment of incorporated radiation doses.

Although this database is more compact than *Chernobyllit*, its strong feature is the inclusion of not only the purely medical aspects, but also some social, psychological, organizational and even technical aspects, if they are related to the health of a human being under radiation exposure.

The sources for the database are:

- ◆ for Belarusian, Ukrainian and Russian literature: the stocks of the RSML (which is its strength, as such materials are very poorly covered in VINITI databases);

- ◆ foreign literature (however, this is under 30% of the total number of abstracts);
- ◆ the stock of RSML (a fragmentary and incomplete collection) and the databases of MEDLINE and INIS on CD-ROMS. Access to the CD-ROMS is provided free of charge by collaborating organizations, i.e. the RSML and the Republican Scientific and Educational Information Centre of the Ministry of Emergency Situations.

It covers literature since 1991; there are over 5,000 documents in this database; the language is Russian.

The Health Protection Ministry project funds unfortunately do not include funds for payment for the use of external information sources which charge for access. They do cover the creation and development of software for online access for external users. At the moment the local computer network of the Department of Health Protection Information Support is being created, and funds for arranging Internet access for external users of the database are not provided.

Priority users are the workers of the Health Protection Ministry. Readers of the RSML are also welcome to use it free of charge. Copies of the database are available in three more medical establishments.

Specialists of the Centre of Medical Technologies, Informatics, Management and Economics of Health also publish (four times a year) a printed compendium of the abstracts from the database. In 1995 they also launched a periodical under the same title as the database which, besides the abstracts section, also includes the full texts of state regulations and Health Ministry instructions dealing with overcoming the medical consequences of Chernobyl and some relevant original papers and reviews written by Belarusian specialists. It is published four times a year.

A Chernobyl-related database with universal content

A project called *Chernobyl* is being undertaken by a team from the National Library of Belarus (of the Ministry of Culture of the Republic of Belarus). This project aims to publish a current bibliographical index *Chernobyl* and to maintain a database of the same content and under the same title at the National Library. The first part of the project is in operation, the second part is near to completion.

The database being created is a bibliographical one, and, at best, very short annotations of the documents are attached to the bibliographical descriptions. It reflects literature on all aspects of the Chernobyl catastrophe, including overcoming its consequences.

selection of the literature is strictly determined by the basic source of the information: the literature subscribed to, purchased or received by the National Library. That means:

- ◆ a certain slant towards scientific literature in social sciences and humanities sources (the National Library of Belarus is really responsible for literature in social sciences and humanities);
- ◆ a greater thematic range based on the stock of the most universal library in Belarus; there is no other database in Belarus that indexes such subjects as Chernobyl in literature and art, or Chernobyl and the church;
- ◆ inclusion of newspaper articles from the majority of Belarusian newspapers and magazines starting from the 'raion' (administrative district) level;
- ◆ a small proportion of foreign literature (approximately 10% according to our rough calculations); literature since 1990 is included.

There are over 12,000 documents in this database (largely because of the inclusion of newspaper and magazine articles). The language is Russian; access will be free of charge (certain parts of the database are already available for computer retrieval). The project is part of the routine work of the bibliographic department of the National Library, with the help of one person from the automation department.

There is online access to the National Library's electronic catalogue for the affiliated libraries of the 'oblasts' (major administrative regions of Belarus). This catalogue was created in 1995 within the framework of the project 'Dissemination of information about new literature in the National Library' (supported by the Eurasia Foundation with help from the US Agency for International Development). this database, when it is ready.

Chernobyl Digest

Finally, there is the project entitled *Chernobyl Digest* (formally *Chernobyl Index*). The team that undertakes this project is grouped around the Ministry of Emergency Situations of Belarus, in collaboration with the Institute of Cytology and Histology and the Belarusian National 'Man and Biosphere' Committee. Within the framework of this project, an annual collection of abstracts is published and recently a corresponding database was created.

Only Belarusian, Ukrainian and Russian literature on the following Chernobyl problems is included:

- ◆ general radioecological problems;
- ◆ nature, including soil, water, flora, fauna and micro-organisms;

- ◆ man, (including general radiomedicine problems), both adults and children;
- ◆ society.

The collection used to be rather small, and the volume of 1993-94 abstracts contains just 256 extended abstracts in Russian (cf. 1,434 items in the last published issue of the *Chernobyl* bibliographic index, covering material over half a year). Only materials that directly relate to the problems of Chernobyl are included (since 1989). That means no description of analogous catastrophes and their consequences and no description of other radioecological catastrophes.

Recently the authors of this project have begun to collaborate with the team from the project 'Medical aspects of the Chernobyl nuclear power plant disaster'. This has enhanced their work and made their files more complete.

In contrast with the other projects, the literature is abstracted in both Russian and English (apart from the literature of 1992, which is only in Russian). The English version contains abstracts which are less detailed, and not all the abstracts are translated into English.

The usefulness of the databases for Belarusian users

The strongest feature of the *Chernobylit* database, from the viewpoint of a domestic user, is its good coverage of world-wide scientific literature. Without this database, a scientist who wishes to achieve completeness in his information retrieval must browse in a dozen and more VINITI abstracting journals, a slow procedure indeed. Besides, the VINITI journals have become much more expensive and the whole collection of their titles is to be found only in a few major libraries in Belarus.

The use of the database *Medical aspects of the Chernobyl nuclear power plant disaster* is the shortest and most convenient way for a Belarusian user to follow up Ukrainian and Russian scientific literature in the subject, especially the proceedings and abstract compendiums of various scientific conferences. The periodical, published under the same name, is a very convenient source. From the author's experience, it can be said that looking through the whole issue of this periodical takes little time, and offers good serendipity.

Chernobyl is an unique source of information on non-medical aspects of the problem (social, psychological etc.). Its sub-collection of the résumés of newspaper and magazine articles makes it still more valuable, even though such articles are being covered retrospectively, and the content of resumes is not detailed enough for any sociological content analysis.

As for the *Chernobyl Directory*, it is the best source of information dealing with the social problems of the Chernobyl catastrophe and its consequences, for a Belarusian user.

So, one can see the effectiveness of the response to the bibliographical aspects of the problem. Since the middle 1990s, there are four good information sources of domestic origin that cover practically all aspects of the question. It is pointless to regret that nobody anticipated the need for special databases on radioecological disasters before. The demerits of these databases are already listed but it should be remembered that this self-regulating specialized information system was created without any co-ordination or centralized planning. Financial support from the State was very small, and the information system appeared as a result of efforts undertaken by enthusiasts.

Potential development of Belarusian databases in the international context

In the present situation, information services in Belarus cannot expect sufficient financing from the State. But plentiful examples of international assistance to Belarusian libraries give us reason to believe that international co-operation may be a more realistic way of developing domestic information systems, which, in their turn, might produce competitive commodities for foreign users.

Chernobylit

The international dimension of the *Chernobylit* database lies principally in its content. *Chernobylit* is the only Belarusian database that covers international scientific literature relatively completely. That is why it is of such importance to Belarusian users, but, for the same reason, it is less attractive for foreign users who already have good access to world-wide literature. As for the literature of the former USSR, it is well known that the VINITI abstracting journals and databases cover this scientific literature incompletely since it was supposed that they would be available at every local library of the former USSR.

It should be mentioned that the *Chernobylit* team applied to the Eurasia Foundation with a project proposal in 1995. Though it was not successful, this seems to be an appropriate route to follow. A very important feature of the project proposal submitted by the *Chernobylit* team was that a network for users outside the Institute of Oncology was planned, with computers and modems for users from the major relevant research institutions as well as funding for the corresponding software to be installed at the Institute of Oncology.

Medical aspects of the Chernobyl nuclear power plant disaster

This database is of potential interest to Western users who search for the results of studies undertaken by researchers from those countries most affected by Chernobyl. Bearing this in mind, the team who created this database also applied in 1996, in collaboration with the present author, to the Eurasia Foundation with a project proposal for launching the English version of this database. Though this team also failed in its bid, this attempt seems not only to be the right way for project development (bearing in mind insufficient home financing), but also,

a good base for the creation of a competitive information commodity for foreign users.

The periodical *Medical aspects of the Chernobyl nuclear power plant disaster*, if published in English, could be very helpful for foreign colleagues who undertake similar research. Possibly, a joint project proposal should be submitted to some international research completion programme. Such a project, in order to acquire scientific status, might be supplemented with scientometric research of Belarusian, Ukrainian and Russian literature. There are good methodical and ideological (but not financial) reasons for such work at the moment.

Chernobyl

Similarly, the information on Belarusian, Ukrainian and Russian literature that is contained in the *Chernobyl* database and in *Chernobyl* bibliographical index may be valuable for foreign researchers. Its wide thematic content makes it a unique means for retrieval of some less common Chernobyl-related issues. The main condition for its international use is the same: the creation of an English language version.

Chernobyl Digest

Despite its shortcomings, the *Chernobyl Digest* project is the only one that gained financial support from abroad (i.e. from the UNESCO Ecological Division) in addition to the support of the Ministry of Emergency Situations of Belarus. Its strong feature is a very good coverage of the subject 'society'. The financial good fortune of this project allows us to hope that the projects *Medical aspects of the Chernobyl nuclear power plant disaster* and *Chernobyl* which seem to deserve the same support, will find international favour.

The Belarusian Library Association

Since international collaboration seems to be the best way for the development of Chernobyl-related Belarusian databases, one of the aims of this paper (the author is at present the Vice-Chairman of the Committee for Research, Education and Training of the Belarusian Library Association), is to provoke international interest: the Belarusian database creators need more promotion of their products in the international arena, but maybe they also need some counter proposals from abroad. Any proposals concerning Chernobyl-related information and possible collaboration may be sent directly to the Belarusian Library Association billboard at <bla-news@kolas-bas-net.by>; newsgroup: <basnet.news.bla>.

It may also be noted that the Bibliography Committee of the Belarusian Library Association whose chairperson Alla Muravyeva is a team member of the *Chernobyl* project, prepared a brief survey of all the original (not only Chernobyl-related) databases that exist in Belarus. Her address is at the end of the paper.

The Belarusian Library Association is open to international research collaboration and will readily do its best to arrange a necessary framework, whatever the specific subject area.

Chernobyl-related information problems for the population

Chernobyl-related information for the population of Belarus was restricted by mass media censorship up to 1989. Feelings of stress, discontent and hopelessness were created by the mass media of the previous regime, which either kept silent or transmitted optimistic nonsense. The politicians kept details of the disaster secret and the inevitable ignorance of the population was fertile soil for the most threatening rumours.

After the final removal of censorship in 1989, a flow of reports from the area of the incident appeared, about supposed congenital abnormalities among animals, supposed increase of the incidence rates of childhood leukaemia and thyroid diseases (15). The journalists' feeling of freedom, and search for sensation, and the scepticism and fear of the population were the basic reasons for this 'second wave' of misinformation. This flow of unreliable information could not be checked by professionals, because people would not have believed them even if they had intervened. A person's activity was often 'directed to only one course: to defending his rights as a victim' (16).

So, it is really of special interest to trace how Chernobyl-related events were reflected in Belarusian newspapers. A pilot content-analysis study was made of some 1991 publications by identifying, sorting and counting all the journalists' notions of 'victims', 'heroes' and 'culprits' of Chernobyl, of projects for overcoming Chernobyl health effects, of organizations, which in the Chernobyl context, were assessed positively or negatively. The results were shocking; they reveal the great emotional impact of newspapers on public opinion. Thus, during just two weeks the inhabitants of Savichi village were thrice called victims, Academician Ilyin thrice called a culprit; 22 victims were mentioned 26 times and 21 of them were (in journalists' imagination) the population of whole cities and settlements including the city of Minsk which was not in the least radionuclide contaminated at all. Another nonsense was the promotion of some organizations whose activity did not have any influence on the situation. Also, the precision, logic and fullness of many publications are inadequate. Some of the medical projects that are obviously associated with Chernobyl health hazards are described without appropriate contexts, and some diseases that are never caused by ionising radiation are associated with Chernobyl, etc.

Such observations lead to the conclusion that in spite of a large number of publications there is a dramatic lack of information for the population. A possible remedy is the implementation of a project that would include: ☐

◆ retrospective retrieval of the different notions reflected in Chernobyl-

- ◆ digesting the publications;
- ◆ creating a database, cumulative retrospective index and periodical bulletin that would include digests, drawing attention to the more paradoxical and misleading features of the reportage;
- ◆ retrospective and follow-up content analysis study of the vast documentary representation of post-Chernobyl subculture.

The objectives and possibilities of such a proposal are multifold: it might help journalists to be more competent and responsible; it might reveal a piece of living history; it could promote the most effective persons and organizations, etc. From a researcher's viewpoint, the outcome of such a project could be a unique source for studies in sociology, public psychology, etc. Such a project would be labour-intensive and not cheap, so international scientific co-operation would seem to be the only way of carrying it out.

Conclusions

The shortage of Chernobyl-related scientific information in Belarus was inevitable due to various reasons. The local databases that were created by enthusiasts to fill information gaps, have many merits, but still need further development. The most realistic way for this development in the future is international co-operation. The unique collections of abstracts of scientific relevant literature of such countries as Belarus, Ukraine and Russia could be made available to the international community as one of the outcomes of such co-operation.

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Appendix: contact addresses of the project representatives

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