



Consultation on the Development of

GLOBAL BIODOSIMETRY

LABORATORIES NETWORK

FOR RADIATION EMERGENCIES:

BioDoseNet

Meeting Report

WHO Headquarters, Geneva Switzerland

17-18 December 2007



BioDoseNet Expert Group (left to right). **Back:** P. Lillis-Hearne, G. Livingstone, W. Blakeley, N. Maznik, M. Hopmeier, Y. Takashima, D. Lloyd, M. Yoshida. **Middle:** K. Fujimoto, P. Voisin, R. Wilkins, M. Perez, H. Romm, U. Kulka, R. Dayel-Dragger. **Front:** Z. Carr and M. Chu.

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I. Introduction and Administrative Remarks

- A. Dr. Maria Neira (Director, Department of Public Health and Environment)
Opened the meeting and welcomed the consultancy meeting participants to the WHO Headquarters in Geneva. Dr. Neira conveyed her vision that the focus of the meeting program was consistent with WHO's mission and falls under the high priority area of the WHO - global health security.
- B. Dr. Gilles Pomerol (Medical Officer, IHR Coordination Programme)
Also welcomed the consultancy meeting participants and informed the group about the revised International Health Regulations (IHR, 2005) and the responsibilities it imposes on the WHO and its 193 Member States. He emphasized the role that laboratory networks can significantly contribute to medical management of public health emergencies and. Threat-specific laboratories networks are being set up as an implementation of the capacity building plan of the IHR programme.
- C. Dr. Maria Neira and Dr. Zhanat Carr
- (1) Invited the consultancy meeting participants to introduce themselves.
 - (2) Attendees accepted the provisional agenda (See Attachment A).
 - (3) Drs. David Lloyd (UK) and Phillipe Voisin (FRA) agreed to co-chair the expert panel consultation meeting.
 - (4) Dr. William F. Blakely (USA) agreed to be a rapporteur and draft the meeting report.
- D. Dr. Zhanat Carr
- (1) Dr. Carr described WHO's role and expertise in response and preparedness for radiological/nuclear events. WHO has a mandate to provide technical assistance in building capacity and medical support and public health advice in case of radiation emergencies. WHO's Radiation Emergency Medical Preparedness and Assistance Network (REMPAN) functions were also described. Key elements of response, including a multiple-parameter dosimetry methods were reviewed along with doctrinal guidelines for biodosimetry applications following acute radiation exposure incidents. The benefits of establishment of a WHO Biodosimetry Network involving cytogenetics, electron paramagnetic resonance (EPR), radionuclide bioassays, etc. were listed. The world-wide distribution of cytogenetic laboratories and regional networks already participating in REMPAN were illustrated. A survey of 35 REMPAN centers indicated significant ESR capabilities are present or planned to start in the near future in these centers. Dr. Carr established the objectives of the consultation on the development of a global biodosimetry laboratories network for radiation emergencies, as follows:
 - To identify the needs and criteria for the labs to be included into the network
 - To develop terms of reference for the network set-up and operation
 - To set up standard operating procedures for
 - emergency network activation
 - Sample collection

- Transportation
 - Tracking
 - Processing (e.g. outsourcing, stockpiling, tele-consulting)
 - Reporting and data sharing
 - To identify the needs for quality management, certification, inter-comparison studies, training, exercise
 - To map out the way forward strategy and recommendations for next steps
- (2) Provided consultation meeting materials including
- the meeting agenda (Attachment A),
 - list of participants (Attachment B),
 - Biodosimetry capacity mini-survey results, December 2007,
 - Alexander et al. BiodosEPR-2006 Meeting: Acute dosimetry consensus committee recommendations on biodosimetry applications in events involving uses of radiation by terrorists and radiation accidents, *Radiation Measurements* 42: 972-996, 2007,
 - Miller et al. Canadian cytogenetic emergency network (CEN) for biological dosimetry following radiological/nuclear accidents, *Int. J. Radiat. Biol.* 83(7): 471-477, 2007,
 - Lebaron-Jacobs et al. Dosimetric management during a criticality accident, *Nuclear Technology* 161: 27-34, 2008.
- (3) Provided administrative details concerning the meeting (internet access, reception, etc).

II. Role of Biodosimetry in the International Response to RN Emergencies

A. There were two presentations from WHO staff related to WHO interest in biodosimetry

- (1) Dr. May Chin-May Chu (WHO) presented a talk that addressed building core capacity under IHR (2005) and the importance role of laboratory networks. Citing the World Health Report 2007 "A Safer Future", Dr. Chu stressed the importance of preparedness and international cooperation to mitigate threats from natural, accidental and deliberate outbreaks. WHO supports Member States efforts to improve their response capabilities. Individual countries face challenges in strengthening their laboratory systems. Regionalized and individualized approaches can be considered with local ownership but enhanced with network involvement. WHO operates an effective event management process for public health event responses. Guidance for capacity assessment for public health response to deliberate use of biological and chemical agents or radioactive materials is being finalized. Examples of the features for of the Global Laboratory Directory Network (GLaDNet) include:
- create "network of networks" directory for "one-stop shopping" for expertise
 - provide a platform for improving preparedness and surge capacity
 - develop a partners benefit package for network members
 - encourage applied research between partners for the public good.

(2) Dr. Renu Dayal-Drager (WHO) presentation provided an extensive overview of the global Epidemics Preparedness and Response (EPR) network of WHO Collaborating Centers for epidemic prone infectious and zoonotic diseases, for emerging and dangerous pathogens. Examples of web-pages for this network were illustrated. In the case of the WHO Global Influenza Programme there are two networks, one focusing on surveillance and the second on research support. One hundred and fifteen member nations participate in the National Influenza Centres program. Objective actions for this Centre program include early detection, notification and response to cases to contain new viruses delay spread, and to implement surge capacity. This laboratory network is composed of several types of laboratories (i.e., global specialized, regional reference, national and sub-national) that share samples, data, and cooperate in training; see Figure 1.

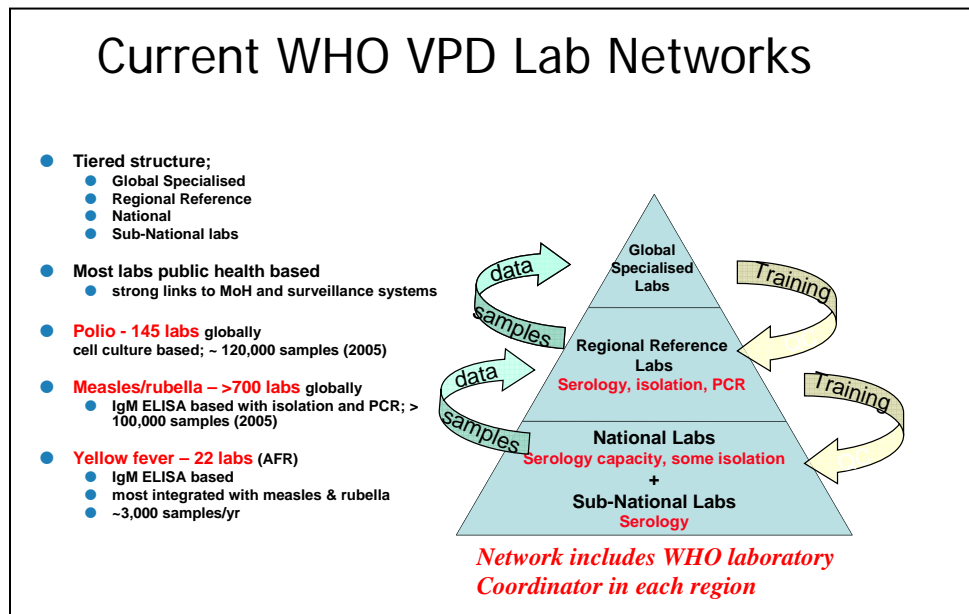


Figure 1. Currents WHO VPD Laboratory networks

Recommendations for next steps to undertake to establish an effective Global Biodosimetry Network were provided based on the global laboratory connectivity of the GLaDNET network as follows:

- to create a directory - "Yellow Pages" of laboratory networks – from questionnaire survey to map potential participants
- to provide a platform for laboratory network partners to work together for global public health good
- to develop guidelines for collaboration that protect individual and national rights to intellectual property
- to engage "neighbors" by promoting joint activities
- to hold biosafety biosecurity awareness workshops on quality assurance, transport

B. IAEA representative make a presentation addressing IAEA’s interest in biodosimetry

(1) Dr. K. Fujimoto (IAEA, Incident and Emergency Centre or IEC) presented a talk on IAEA’s interest and activities in biodosimetry. The IEC’s mission is as an international focal point for preparedness, communication, and response for nuclear

and radiological safety or security related incidents, emergencies, threats or events of media interest. In 2000 IAEA established the Response Assistance Network (RANET), previously called Emergency Response Network (ERNET), of teams suitably qualified to respond rapidly and, in principal, on a regional basis, to nuclear or radiological emergencies. RANET's areas of assistance include: i) advisory, ii) assessment and evaluation, iii) monitoring, and iv) recovery. The responsibilities within RANET involve assistance in response to nuclear accidents, radiological emergencies, or other nuclear or radiological events were described. The National Assistance Capabilities (NAC) has 12 special fields of expertise and types of assistance are shown in Figures 2 and 3. Several copies of the EPR-RANET 2006 publications were made available.

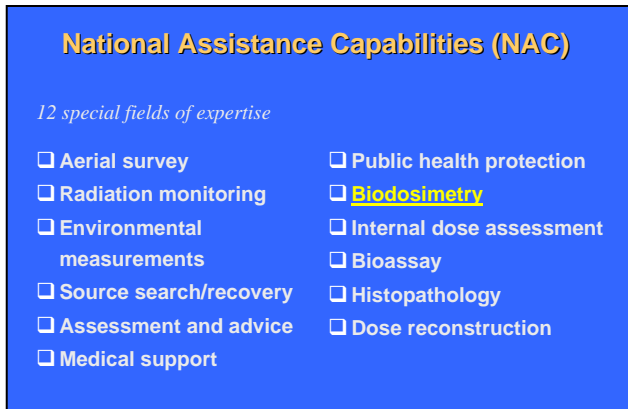


Figure 2

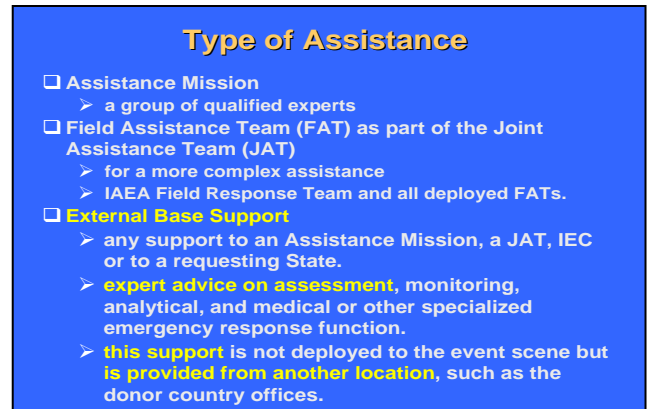


Figure 3

Dr. Fujimoto also reviewed numerous radiation accidents illustrating the use of biodosimetry; accident reports from these incidents are available from IAEA's website. IAEA has a long standing involvement in biological dosimetry including: a) sequence of Coordinated Research Programmes, b) regional training courses, c) fellowships, and d) provision of equipment in developing Member States. In 2001, IAEA provided an update on the "Cytogenetic Analysis for Radiation Dose Assessment – A Manual" (Technical Report Series N405). IAEA on-going activities and interest in biodosimetry are shown in Figures 4 and 5.

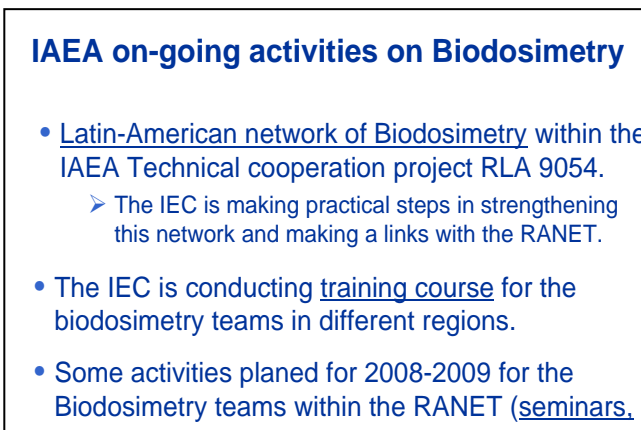


Figure 4



Figure 5

C. ISO new report on cytogenetic triage – a technical tool

(1) Dr. P. Voisin (France) presented a talk on ISO Working Group 18 efforts to standardize biological dosimetry. Examples of the utility of cytogenetic biodosimetry to confirm exposures and provide dose assessments were illustrated. In 2004 ISO has established an international standard – Performance criteria for service laboratories performing biological dosimetry by cytogenetics (ISO 19238). This standard addresses quality assurance and quality control to permit accreditation of biological dosimeter by cytogenetics. Revisions of ISO standard 19238 are in progress to improve precision of methodology description, calculations of the dose-response curves, and inclusion of an accreditation protocol.

An example for a radiation accident in Africa that involved population triage was presented. Dr. Voisin described the rationale of a network in the case of emergency response (Figure 6 below).

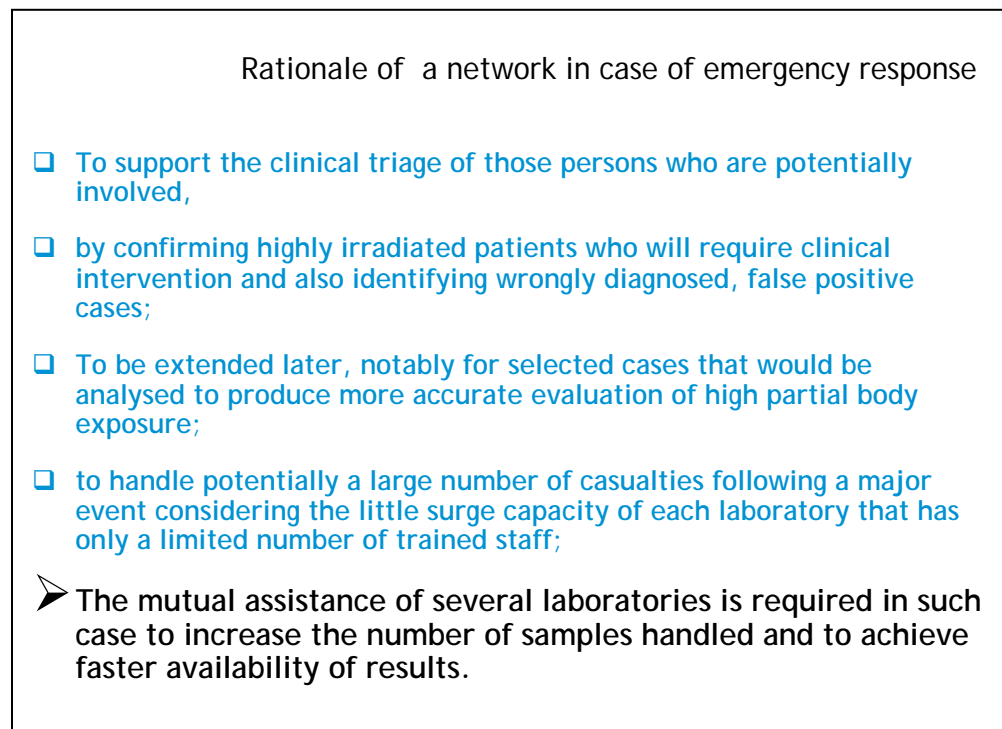


Figure 6

WG 18 is currently finalizing an ISO standard for “Performance Laboratories for Service Laboratories performing Cytogenetic Triage of mass casualties in radiological or nuclear emergencies – General principles and application to Dicentric Assay (ISO Standard 21243). The purpose and scope of this standard are shown in Figure 7. Several features of the new ISO standard including: a) emergency response of the reference laboratory, b) laboratory network activation, c) preparedness of the laboratory/network, and d) QA & QC of the laboratories network were illustrated.

Purpose and Scope of the ISO Standard 21243

N Purpose:

- To provide a guideline to all laboratories in order to perform the dicentric bioassay - cytogenetic triage for dose assessment using documented and validated procedures.
- To facilitate the application of cytogenetic biodosimetry networks to permit comparison of results obtained in different laboratories.
- Laboratories newly commissioned to carry out the cytogenetic triage should conform to this standard in order to perform it reproducibly and accurately.

N Scope:

- To give an overview of the minimum requirements of process and quality control components of the cytogenetic response for triage of mass casualties.
- Cytogenetic triage is the use of chromosome damage to evaluate approximately and rapidly radiation doses received by individuals in order to supplement the early clinical categorization of casualties.
- The standard concentrates on organisational aspects of applying the dicentric assay for operation in a triage mode.
- The technical aspects of the dicentric assay can be found in the ISO Standard 19238.
- The document is directed to either an experienced biological dosimetry laboratory working alone or to a network of collaborating laboratories.

Figure 7

D. Report on Survey of Nation/State Capacities

(1) WHO executed a survey of nation/states capacities, facilities, and resources. Mr. Michael Hopmeier (USA) presented a summary report from this survey. WHO sent the questionnaire to over 50 laboratories/facilities around the world. Responses from 32 laboratories so far were reported. The questions asked are shown in Figures 8 and 9. Table 1 provides a summary of the responses to the survey. Clearly, the opportunities for coordination, resources sharing, and improvements in national capacities by establishing a global biodosimetry network exists. The network would also provide a platform for providing cytogenetic lab response in emergency management.

QUESTIONS

1. How many staff do you have who are skilled in
 1. culturing lymphocytes and
 2. scoring for dicentrics?
2. Do you have automated systems available eg metaphase finder and how many work stations?
3. How many blood samples can you process in response to a sudden request to respond to a multi-casualty event, taking account of your normal holdings of consumables (medium, serum, plasticware etc)?
 1. Are consumables easy to renew/obtain in your country ?
4. What radiation(s) is your lab calibrated for?
5. Which statistical methods do you use for curve fitting and calculating uncertainty on dose estimates ?

Figure 8

QUESTIONS

6. If asked to score 50 metaphases per patient (triage mode) how many samples could you realistically score in a week taking account of your available trained staff (who would also be doing the 'wet work')?
7. Are you in a QA&QC compliance, and how far have you written your procedures ?
8. How is the collection of blood samplings for biological dosimetry in your country organised, from field to lab ?
 1. Do you have a pre-arranged organised relationship between biodos lab and medical doctors ?
9. What do you expect of/ How do you see your participation in the establishment and the maintaining of a biological dosimetry network?

Figure 9

Table 1. Summary of Biodosimetry Capacity Mini-Survey Responses

#	Question	Responses
1	Staffing - lymphocyte culturing - dicentric scoring	- most have 3-4 per facility - most have 3-4 per facility Note. Same people may do both culturing and scoring
2	Automation - none - automated metaphase finders	- 9 out of 25 responding labs - most
3	Capacity - average number - time frame - access to consumables	- average 170 samples per lab; ranged from 0 to 1800 - hours to weeks - varied responses, generally available in days to weeks
4	Radiation quality	Most: ^{60}Co and various X-ray energies Many: ^{137}Cs , fast neutrons Few: Tritium, thermal neutrons, plutonium, ^{241}Am , fission neutrons
5	Statistical methods	Most labs used standard statistical methods based on IAEA standards or methods shared by UK and German labs. Other specialized statistical software included DOSGEN, PolyFitA, and IRLS.
6	Sample throughput in one week	at least 50 samples – 7 of 25 responding labs/facilities 30-50 samples – 7 of 25 responding labs/facilities <30 samples – 11 of 25 responding labs/facilities
7	QA & QC compliance	3 - ISO 9000/9001; 2 – ISO/IEC 17026; 2 – ISO 19238; 1 – ISO 14001; 2 – CLIA; 12 – custom standard; 7 - none
8	Blood sampling coordinated	most – ad hoc; 12 – plans in place; rest – in development
9	Expectations of network	varied responses

Expert Panel Consultation Recommendations on the Development of Global Biodosimetry Laboratories Network for Radiation Emergencies

Laboratory Capabilities (Figure 10) and Capacity (Figure 11) Criteria Defined

1. Lab Capabilities Criteria

- **Experience in dicentric biodosimetry is a must, plus other techniques (MN, PCC)**
- **In-house calibration curves**
- **QA programs and clearly written protocols**
- **Participation in inter-comparison**
- **Publications record**
- **Sustained expertise, training programmes**
- **Compliance with appropriate national laws and regulations is a plus**
- **Independent from WHO funding is a plus**


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Figure 10

2. Lab Capacity Criteria

- **Throughput must be 30 triage cases/week sustained for 4 weeks (higher throughput/ longer sustainability is a plus)**
- **Demonstrated capacity to process 30 triage samples or more per week in emergency is a plus**
- **Available consumable resources (reagents, plastic-ware) to analyse 120 samples in 4 weeks (ISO)**
- **After triage, ability to follow up with a suitable more detailed analysis (up to 500 met/case) for those cases who need further dose refinement to support clinical management**


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Figure 11

E. Emergency Scenarios for Activation of Network (Figure 12) and Labs (Figure 13) Defined

3. Emergency Scenarios

- **A significant radiological event of any origin**
- **Lack of national BD* capacity or an emergency scale exceeding national BD capacity to respond**
- **Request of international assistance or acceptance of assistance offer**

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Figure 12

F. Major Steps and Process in Utilizing the Network in Emergencies (Fig 13 and 14)

4. Major steps in utilizing the network in emergencies

- **Event detection/verification (point zero)**
 - from mass-media or formal channels (MS, WHO offices, notification under Conventions or IHR)
- **If requested, international agencies (WHO, IAEA) can assist with assessing the BD needs and appoint core lab for coordinating BD**
- **WHO facilitates the interaction between requesting nation's health authorities and assisting in communication of ref labs with health care facility throughout the entire period of response**
- **Evidence-based patient selection and prioritization for BD**
- **Sample collection, labelling, transportation, performance of a cytogenetic lab in terms of sample processing/analysis in compliance with ISO standard**

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Figure 13

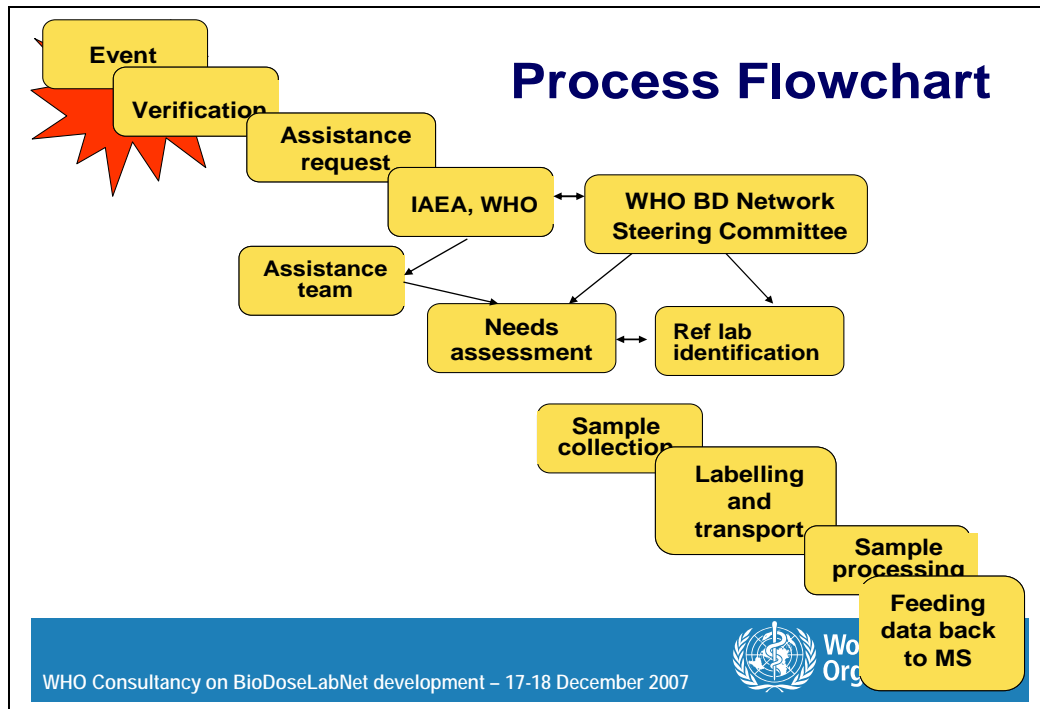


Figure 14

III. Rationale of a Network in Case of Emergency Response (ISO; Figure 15) and Patient Selection for BD testing (Figure 16) Defined

5. Rationale of a network in case of emergency response (ISO)

- to support the clinical triage of those persons who are potentially involved, by confirming highly irradiated patients who will require clinical intervention and also identifying false positive cases
- for selected cases, to further analyze the samples to produce more accurate evaluation of high partial body exposure
- to handle potentially a large number of casualties following a major event considering the little surge capacity of each laboratory that has only a limited number of trained staff
- mutual assistance of several laboratories is required in such cases to increase the number of samples handled and to achieve faster availability of results

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Figure 15

6. Patient selection criteria for BD testing

- In mass-casualty event, victims in critical need for BD are those exposed to radiation with clear clinical symptoms
- Majority of affected persons may need BD for psychological impact management "reassurance" – not a priority for the network use
- Evidence-based patient selection and prioritization for BD, using clear criteria such as:
 - Accident history
 - Clinical symptoms
 - Physical measurements
 - Resource availability
- The responsibility for patient selection for BD testing lays with responding experts in the field, however the network may make recommendations with this regard
- Responders should be informed about BD possibility and its role, as well as be able to correctly collect/ship samples

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Figure 16

A. Cytogenetic Sample Collection Kit (Figure 17) and Samples Transportation (Figure 18) Defined

7. Cytogenetic sample collection kit

- Steering committee to write clear procedures for sample collection (RANET attachment 3 contains instructions for cytogenetic labs, plus see REAC/TS guidelines sent by M. Jenkins)
- Sample collection kits can be added to WHO RN stockpile (an option of clinical priority coding on the label to be considered)
- The steering committee will provide clear guidance on sample labelling in the field with unique identifier
- A work-sheet for dynamic recording of exposure and clinical data to be developed and accompany sample collecting kit or made available otherwise (downloadable from the web?)

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Figure 17

8. Samples transportation

- In compliance the UN sample shipment regulations (ICAO) – information to be available on the network's website
- The key point is to have **pre-arranged process between national customs and the labs**
- **Two ways of distributing samples**
 - Samples shipped to different reference labs directly (lab has no responsibility for shipment)
 - Samples/slides further forwarded by ref labs to satellite labs (lab may be responsible for shipment)
- Same protocol may be used for emergency as for inter-comparison studies
- **Bottlenecks:**
 - Time-sensitive (max 48 hrs)
 - Customs clearance, not subjected to x-ray for security (put a TLD in the shipping box)
 - Weight/volume limitations
- **Steering committee to write a clear guidance for sample transportation**

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Figure 18

B. Sample Coding and Prioritization (Figure 19) and Output of BD Triage Needed by Physicians (Figure 20) Defined

9. Sample Coding and Prioritization

- Each reference lab* codes received samples according to the standard protocol (see ISO 21243)
- Associated labs use the same code for communications with the reference lab
- Based on clinical feedback to the reference lab, some samples may be assigned as a higher priority for scoring

***Note. WHO will designate on Ref. Lab. as the core for an event that defines the sample coding and standard protocol.**

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Figure 19

10. Output of BD triage (in 50 spreads) needed by a physician

- **Dose interval**
 - Zero to 1.0 Gy
 - 1.0-3.5 Gy
 - 3.5-5.0 Gy
 - Above 5.0 Gy
- **Exposure distribution (partial, whole-body, homogeneous or non-homogeneous)**
- **Reporting form – in compliance with ISO 21243**

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Figure 20

C. Reference and Core Laboratory Definition, Laboratory Tasks, and Candidate Reference Labs (Figures 21 - 25)

11. Reference Laboratory Definition

- **Must be identified before emergencies in compliance with the new ISO standard**
- **A regional core lab assigned in emergency to facilitate coordination of sample distribution, processing, analysis, collating results from satellite labs and interpretation. It acts as a focal liaison channel between BD and the medics.**
- **To be added later based on EM communications**

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Figure 21

12. Core Lab Tasks in Emergency

- Core lab is one of the reference labs activated for emergency response
- Response on a 24/7 basis when activated
- Receiving and coding samples
- Outsourcing, coordination of satellite labs
- Sample processing and analysis
- Data entry in the DB, interpretation and exposure assessment
- Feeding results back to the requesting authority in the accident state
- Provides consultation on the case-by-case basis as required

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Figure 22

13. Reference Lab Tasks in "Quiet" Time

- Provision of "golden standard" protocols and calibration curves
- Evaluation of new diagnostic/analysis tools
- Peer-review of network labs performance
- Regularly tests its communication channels
- Conducting inter-comparison studies
- Participating in exercises
 - at least once per 2-3 years to hold all-network exercise with some 10 samples/lab
 - Other smaller type of exercises and tests may be carried more frequently (desktop exercise, communication drills, national, regional exercises)
 - Each reference lab is responsible for single-lab exercise programs and staff qualification
- Providing BD training for lab personnel and contributing in WHO REMPAN training programs for health workers

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Figure 23

BioDoseLabNET

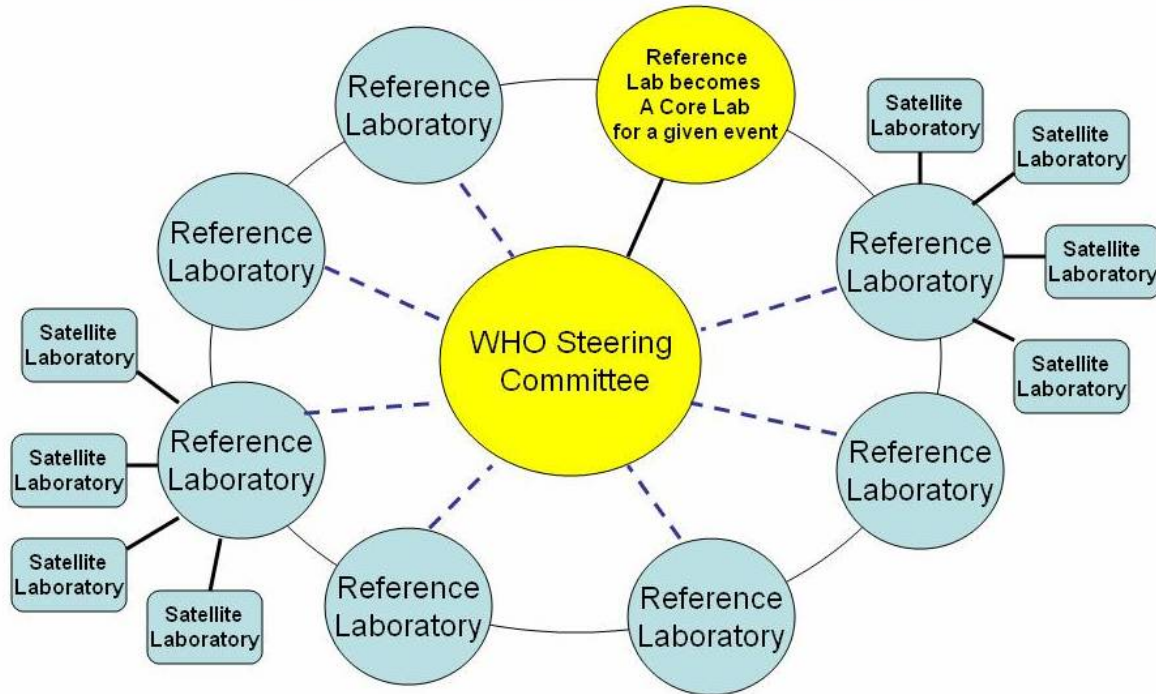


Figure 24. WHO BioDoseLabNet structure, roles and functions of laboratories in case of emergency. Any Reference Laboratory may become a Core Laboratory in a given event, depending on geographical factor, scale of the accident, etc. WHO Steering Committee will assign a Reference Laboratory to take up a role of a coordinate

14. Candidate Reference Laboratories

- UK HPA
- France IRSN
- Germany BfS
- Finland STUK
- Canada HC
- Japan NIRS
- Argentina, ARN
- Ukraine, IMR Kharkiv
- Russia, Obninsk MRRC

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Figure 25

D. Benefits (Figure 26) and Framework (Figure 27) of Network Membership

15. Benefits of Network Membership

- Linking partners within regions and globally by action
- Training programs
- Standardization/Certification/peer-review appraisals
- Career enhancement
- Banking of “gold standard”
- Collaboration for applied research
- Reagent sharing
- Mediation
- Standardized Templates for MOU, MTA, IRB
- Study templates: (Multicenter)
- Increased visibility and a tool to secure funds for the labs – members of the network


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Figure 26

16. Framework for the Network membership

- Templates for MOU and other agreements documents/letters are available at WHO. MOU requires permission/approval of the institution's head and expires every 4 years
- Network is coordinated by WHO with support of the Steering Committee
- Neither being part of WHO REMPAN nor registration with IAEA RANET are required for the WHO network membership. Participating in both networks is not mutually exclusive and is encouraged


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Figure 27

IV. BioDoseLabNet Terms of Reference (Figures 28 and 29)

17. BioDoseLabNet Terms of Reference

- Participating laboratory commits to providing its services in emergency
- Primarily, the network performs emergency BD assessment of exposure according to standard protocols
- The network employs BD protocols approved by steering committee
- The network also evaluates new diagnostic tools and recommends their use
- The network performs peer-review evaluations of labs and reports are shared within the network


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Figure 28

17. BioDoseLabNet Terms of Reference (2)

- A common form of information sharing among the network will be identified (e.g. secure website as interactive resource center, reports, meetings etc.)
- Not raw data but aggregated information will be shared/discussed within the network.
- Data is owned by the country requesting the BD service
- Reporting of data is done only through designated lead reference lab
- No public release of information by network members, request for information redirected to the leading committee coordinating response


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Figure 29

A. Exercises (Figure 30), Education and Training (Figure 31)

Exercises

- Exercise programme is essential for improving SOPs and identifying weak points of response
- The network will run inter-comparison exercises (blood sample processing, and/or slides scoring and data treatment), once a year, coordinated by the Steering Committee
- Intra-comparison exercises are run in individual labs as a part of QA programs
- Emergency service + inter-comparison exercise
 - All-network exercise - once in 2-3 years
 - National exercises - as required
- Table-top/simulation exercises are also an option.
- Communication tests and drills (labs are to inform immediately about changes in contacts, names, positions)


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Figure 30

Education and Training

- Education and training provided by the network's reference labs supports an entry of a new lab to the network
- The network is informed about existing training programs at the ref laboratories, including
 - Lab technician training on the job for new recruits
 - Radiation biosimetry specialist training/refreshment at the reference labs
 - other
- Ref labs provide technical contribution to the curriculum of medical response training provided by various parties
- Peer learning via workshops, seminars, meetings is encouraged


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Figure 31

B. Network Auditing and Recognition (Figure 32) and Consumables Sharing (Figure 33)



Auditing and recognition	Consumables sharing
<ul style="list-style-type: none"> ▪ ISO certification is not a requirement but a plus ▪ Compliance with established in the lab in-house QA/QC procedures ▪ National certification ▪ Network membership certificate – given after external evaluation by an ad-hoc committee ▪ "WHO Laboratory of Excellence" - a recognition and award, resulting from an audit against criteria defined by the Steering Committee ▪ WHO roster of experts from the reference labs list 	<ul style="list-style-type: none"> ▪ Catalogue of consumables is available in the IAEA 2001 manual ▪ Most wanted reagents/manufacturers/price lists to be compiled ▪ Labs in lesser developed states experience supply shortage ▪ Network may provide solutions <ul style="list-style-type: none"> – Network members pledge (inventory?) – Manufacturer pledge (manufacturers review is available at IRSN and Health Canada) – WHO stockpile – may be an option to explore ▪ A sub-committee of the network will be set up to develop an ConOp for reagent sharing process
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Figure 32

Figure 33

V. Recommendations of the Expert Group to WHO with respect to BioDoseNet (Figures 34-37)



Recommendations of the Expert Group to WHO with respect to BioDoseNet	Recommendations (2)
<ul style="list-style-type: none"> ▪ Facilitate establishment of the network (develop ToR, SOPs, provide model MOU) ▪ Coordinate operations in "quiet" period. ▪ In emergencies, in cooperation with IAEA, to facilitate provision of assistance ▪ Support inter-comparison studies and exercise programs ▪ Set up a stockpile of consumables, including sample collection/shipping kits ▪ Support knowledge sharing platform for the network (secure internet server, meetings, reports etc.) ▪ Advocate for strengthening national BD capabilities as a part of IHR implementation national programs 	<ul style="list-style-type: none"> ▪ to adopt the ISO emergency cytogenetic triage procedures ▪ to facilitate harmonization of QA criteria/programs ▪ To develop a harmonized worksheet for information collection to facilitate better interaction between clinicians and BD laboratories. ▪ to identify reference labs and establish their roles in the network ▪ to coordinate external peer-review mechanism between labs in the network ▪ to advocate for BioDoseNet and for expertise sustainability in general ▪ to identify gaps and research needs and provide a platform for information exchange and evaluation of new tools (e.g. feasibility of tele-consultation for analysing digital images remotely)
<p>WHO Consultancy on BioDoseLabNet development – 17-18 December 2007</p> 	<p>WHO Consultancy on BioDoseLabNet development – 17-18 December 2007</p> 

Figure 34

Figure 35



Next Steps (1)	Next Steps (2)
<ul style="list-style-type: none"> ▪ WHO Secretariat will circulate the meeting report for comments, to be finalized by end-Jan 2008 (based on the meeting report to publish a paper) and a LoP for Geneva meeting ▪ Model MOU will be shared with the group. Individually modified MOUs will be exchanged between the laboratories applying for the BioDoseNet membership. ▪ Labs meeting the criteria for a "Reference Laboratory" status will be identified ▪ The Steering Committee will be set up and its role defined, consisting of representatives of reference labs and meet prior to the 1st Coordination meeting ▪ Topic-specific WGs to be set up (e.g. WG on automation, WG on harmonization, WG on new tools evaluation, WG on peer-review evaluations, etc). 	<ul style="list-style-type: none"> ▪ Compilation of BioDoseNet Yellow Paged directory ▪ Development of Blue and Green Pages according to the GLaDNet model ▪ To hold the 1st coordination meeting to be planned by mid-2008 (explore the possibility to hold it as a satellite to BioDose-2008 meeting planned for Sept 2008 in USA – W. Blakely to negotiate with the Organizing committee) ▪ IRSN will develop a secure website for the network ▪ Reference library to be added to this website – all members to send to P. Voisin relevant publications ▪ Survey questionnaire to be modified and another survey to be carried out in due time
<p>WHO Consultancy on BioDoseLabNet development – 17-18 December 2007</p> 	<p>WHO Consultancy on BioDoseLabNet development – 17-18 December 2007</p> 

Figure 36

Figure 37

VI . Final Session and Conclusion

Summary

- (2) Drs. Lloyd and Voisin reviewed the summary report with the Consultation Expert Panel.
- (3) Dr. Carr indicated that the editor for Health Physics Journal indicated his interest in publishing a meeting report from this Consultation. [Note. After the meeting Dr. Blakely also received encouragement for submission of the meeting report from the editor for Radiation Research.]
- (4) The Consultation Expert Panel agreed on the name for the network, BioDoseNet.
- (5) There were discussions on potential plans to next meet in conjunction with another international meeting (i.e., BioDose-2008, Sept 7-11, 2008 Dartmouth Medical School, Hanover, NH).

Adjournment

Closing

- (6) Dr. Carr thanked all members of the Consultation Expert Panel for their contributions and adjourned the meeting.

Enclosures

(3)

- | | |
|---------------|--|
| Attachment A. | Agenda |
| Attachment B. | List of Participants |
| Attachment C. | Instructions for Drawing and Shipping Blood Samples for Cytogenetic Biodosimetry (REAC/TS CBL, Oak Ridge, TN, USA) |

Attachment A.

AGENDA

Day 1 – Monday, December 17	
Plenary session 1	
09:00-9:30	<ul style="list-style-type: none"> • Welcome: <ul style="list-style-type: none"> - M. Neira, Director, PHE - G. Pומרol, IHR • Adoption of the agenda and introduction of participants • Objectives of consultation - Z. Carr.
09:30-10:30	<p>The role of biodosimetry in the international response to RN emergencies:</p> <ul style="list-style-type: none"> • WHO interest in biodosimetry <ul style="list-style-type: none"> - International Health Regulations (2005) and GLaDNet - M. Chu - Existing WHO networks as models of a threat-specific laboratory network - R. Dayal-Drager • IAEA interest in biodosimetry - K. Fujimoto • ISO new report in cytogenetic triage - a technical tool - P. Voisin
10:30-11:00	Coffee break
11:00-12:30	<ul style="list-style-type: none"> • Nation/state involvement <ul style="list-style-type: none"> - What are the capacities of each nation represented at the meeting? - What lab/test facilities do they have? • Review of survey of resources (• List of capacity criteria to include to the network
12:30-13:30	Lunch
13:30-15:30	<p>Discussion of assumptions, scenarios, and operations in emergency</p> <ul style="list-style-type: none"> • Various scenarios for network use in emergencies • Major events/steps in utilizing network in emergencies <ul style="list-style-type: none"> - Event detection and verification - Determination of likely number of samples needed to analyze - Evidence based approach to prioritize/select patients for cytogenetic biodosimetry - Collection, labeling and transport of samples - Data tracking and reporting back to the incident/command center/hospital - Chain of custody - Continuous monitoring • What is required? Criteria for: <ul style="list-style-type: none"> - Sample throughput - Accuracy/uncertainty levels - Storage, sample preparation and outsourcing - Communication - Data analysis, new tools (automation, remote scoring via internet?) - harmonization of biodosimetry data/worksheet for recording - QA/QC -

15:30-16:00	Coffee break
16:00-18:00	<p>Discussion of assumptions, scenarios, and operations in normal conditions</p> <ul style="list-style-type: none"> • Standard protocols <ul style="list-style-type: none"> - ISO (2008) - Consensus paper - in <i>Rad Measur 2007, V42, N6-5</i> - IAEA manual (2000) • Calibration curves - part of the standard protocol discussion? • Reference laboratories and certification <ul style="list-style-type: none"> - What is their role? - What are the criteria for and types of certification? • Intercomparison exercises <ul style="list-style-type: none"> - How often? <p>Who participates, who evaluates, who sponsors?</p>
18:30-20:00	Cocktail reception, WHO restaurant

Day 2 – Tuesday December 18	
Session 2	
9:00-10:30	Defining the Terms of Reference for the network: <ul style="list-style-type: none"> • Agreements • Coordination between states <ul style="list-style-type: none"> - Transport of samples - Sharing of data • Data ownership/security • Legal issues / confidentiality • Coordination between countries <ul style="list-style-type: none"> - Customs - Transportation/logistics - Communications - Prioritization - Multiple incidents and complex emergencies
10:30-11:00	Coffee break
11:00-12:30	Discussions <ul style="list-style-type: none"> • Commitments • Preparedness • Exercises <ul style="list-style-type: none"> - Frequency - SOPs for exercises and evaluation • Draft agreement structure
12:30-14:00	Lunch
14:00-15:30	Discussion continues <ul style="list-style-type: none"> • Personnel training <ul style="list-style-type: none"> - Where are the training centers? - What are the training needs today? - Roster of experts and certification? • Knowledge management <ul style="list-style-type: none"> - Databases - Protected website etc. • Reagent sharing and stockpiling <ul style="list-style-type: none"> - Supply needs specifically to support studies: - Identification of supply needs - Estimation of the costs -
15:30-16:00	Coffee break
16:00-17:00	Final Discussion <ul style="list-style-type: none"> - Summary - Conclusions & Recommendations Close

ATTACHMENT B.

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Attachment C.

REAC/TS CBL Sample Instructions for Drawing and Shipping Blood Samples for Cytogenetic Biodosimetry

Drawing Blood Samples

Collect one (1) 10ml sample of venous blood (7-10ml is acceptable) per person in a 10ml lithium heparin vacutainer and gently invert to mix the sample.

Note: Lithium Heparin is preferred and should be used if available. Sodium Heparin can be used if lithium heparin is not available, but it is NOT preferred. Do NOT use any other tubes, such as EDTA.

Clean any blood that may be on the top of the vacutainer with an alcohol wipe prior to packaging for shipment.

Label each vacutainer with the person's name, date/time of blood draw, and date of birth. Keep the blood samples at room temperature, do **NOT** refrigerate.

Packaging the Blood Samples for Shipment (FedEx or DHL Shipment – Instructions for shipping by UPS or USPS may be different.)

For shipments by air, the International Air Transport Association (IATA) requires that blood samples be packed according to Shipping Instruction 650 for transporting diagnostic specimens. The shipper must be trained in order to ship the blood samples.

Note: The shipping container supplied by the REAC/TS CBL is tested to meet the shipping regulations for a Diagnostic Specimen. Any packaging used must be tested to ensure that it meets these requirements. The packing material and methods are specific for Diagnostic Specimens of human blood samples.

Pack the samples in a package that meets the shipping requirements of DOT/IATA as applicable. The vacutainers are the primary container and have passed the laboratory test to be 95kPa compliant.

Tape the top of the vacutainers to ensure that the tops remain in place. Place the vacutainers in the Styrofoam holder with the absorbent material. Tape the edges of the Styrofoam holder with the waterproof tape provided. Place the Styrofoam holder/samples inside of the plastic bag (also 95kPa compliant) but do not seal the bag yet. Complete the inventory list label and place on the plastic bag. Include the number, size, type, and structure of the vacutainers (e.g. 3-10ml lithium heparin plastic vacutainers filled with 7-10ml of human blood). Slide the bag and foam into the cardboard box and then seal the bag.

Place the dosimeter in the cardboard box. If you are using the supplied sample and shipping package, there is a dosimeter supplied and it is to be sent back in the package with the samples. If you do not have the REAC/TS CBL packing materials include a dosimeter in the package (dental film, etc...) if possible.

Place tape over the locking tabs of the cardboard box.

Complete the “Shipper Contact Information” and “To” labels, and along with the UN3373 label, place on the outside of the cardboard box.

The shipping box must be labelled as “Biological substance, category B” with a UN3373 label.

Place the box in the overpack (FedEx Clinical Pak, etc...), if applicable (if it is on the overpack) mark the box on the overpack that the shipment meets the definition off “Biological Substance Category B packed in compliance with IATA Packing Instruction 650”, fill out the air waybill (the text “Biological substance, category B” and “UN3373” must appear on the air waybill in the “Nature and Quantity of Goods”), and place a “Do NOT X-ray” label on the overpack bag/package. Try to ensure that the package is not X-rayed.

Ship at room temperature (NO dry ice), but if temperature extremes are expected, having the samples in Styrofoam/etc... is needed to help moderate the temperature.

Make sure the air waybill is clearly labeled with "Cytogenetic Biodosimetry Laboratory-REAC/TS".

Shipping Address:

Cytogenetic Biodosimetry Laboratory-REAC/TS
ORAU\ORISE
1299 Bethel Valley Road
Oak Ridge, TN 37830