



-Fortuna Favet Paratis-

est. 2006

Radiation Injury Treatment Network[®]: Shared Resources for Rad/Nuke Disaster Preparedness

Cullen Case Jr., EMPA, CEM, CBCP, CHEP

RITN Program Manager

National Marrow Donor Program/Be The Match

NAS Epi Workshop Washington, DC

March 2019

Radiological disaster preparedness a tale of two cities.....

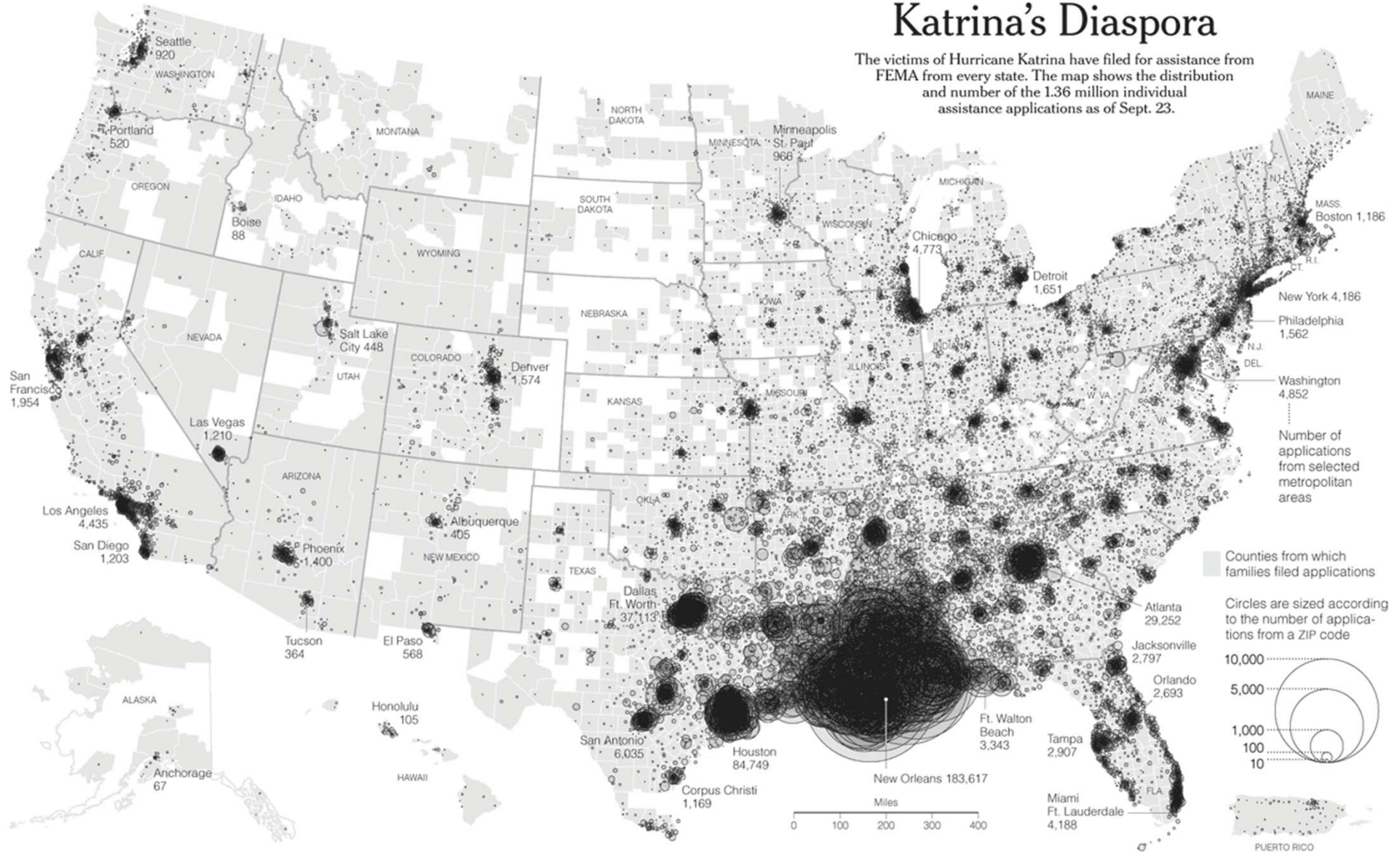
Disaster Effected Community & Distant Receiving Community





Katrina's Diaspora

The victims of Hurricane Katrina have filed for assistance from FEMA from every state. The map shows the distribution and number of the 1.36 million individual assistance applications as of Sept. 23.



Leveraging transplant community capabilities for preparedness



Partnered with ASBMT from beginning it is the pre-imminent association scholars and clinicians in transplantation



Established network and experience with coordinating transplants

2016:
YEAR
AT A
GLANCE

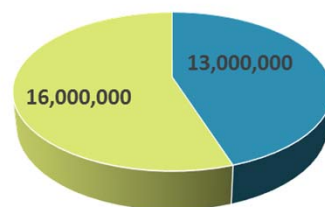


6,200 patients
received a marrow
transplant,



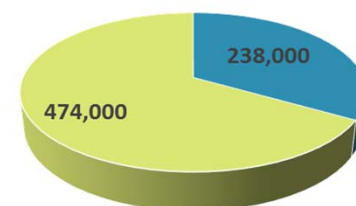
80,000
since 1987

Volunteer Marrow Donors



■ International ■ US (on Be The Match/NMDP Registry)

Cord Blood Units



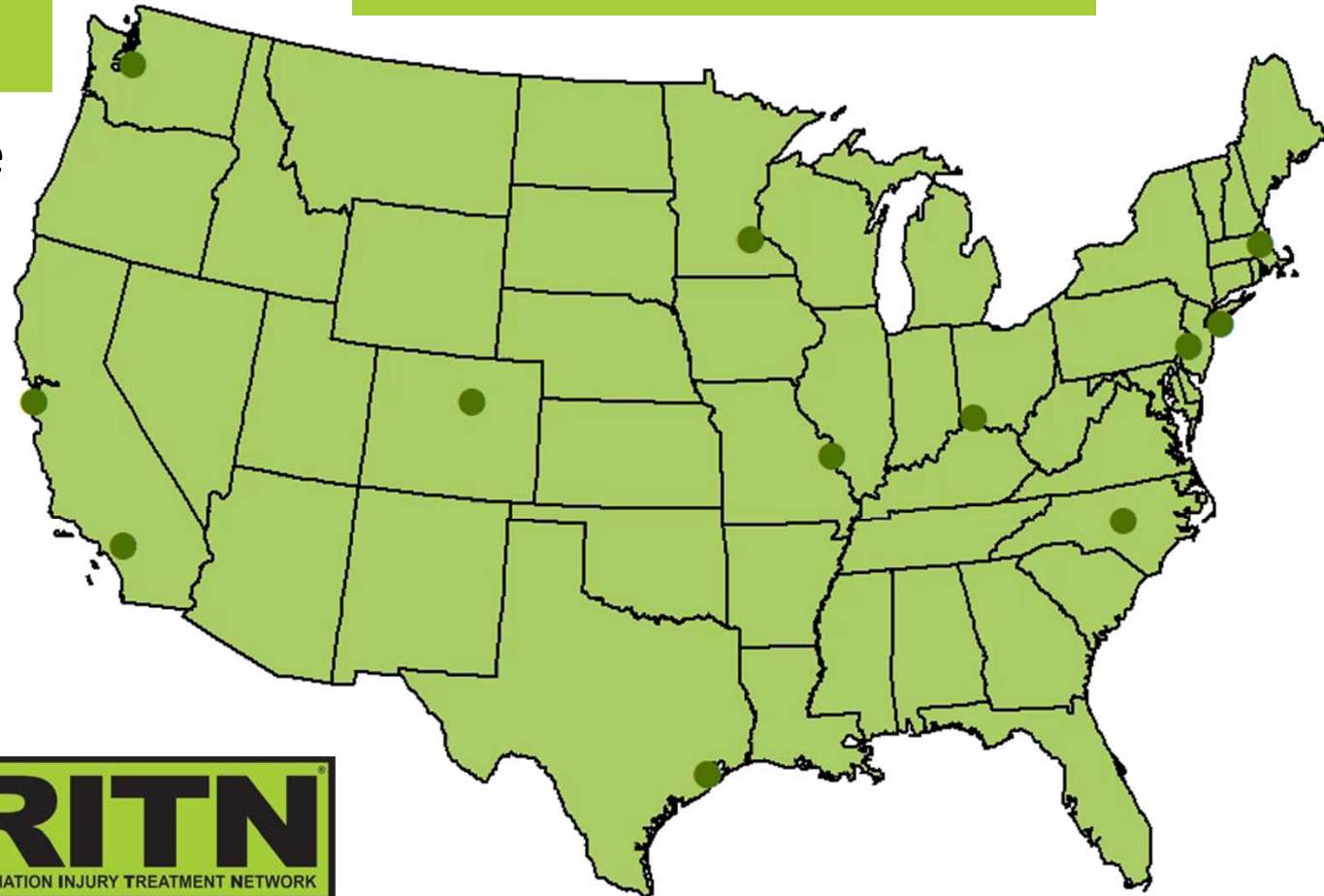
■ International ■ US (on Be The Match/NMDP Registry)

What is RITN? & Why Cancer Centers

Year: 2006

For list go to RITN.net/about

- RITN is focused on the care of ARS patients in cities distant from the disaster
- RITN = Hematology/Oncology/ Bone Marrow Transplant medical professionals
- RITN receives ARS patients through NDMS



RITN Preparedness Efforts.... Exercises, Training and More....

— Since 2006 —



725 exercises

***All exercise materials available on RITN.net



16,450 medical staff trained

***Free web-based courses available on RITN.net



18,400 dose of G-CSF, Peg G-CSF & GM-CSF on-hand

***Fluctuates throughout year, is sum of inventory at each RITN hospital



2,160 adult & 875 pediatric ARS inpatient beds w/in 24 hrs

2,825 adult & 1,130 pediatric ARS outpatient beds w/in 24 hrs



73 hospitals and cancer centers

Treatment Guidelines on RITN.net/treatment



Acute Radiation Syndrome Treatment Guidelines

Please forward co

Radiation Injury Treatment Network Acute Radiation Syndrome Treatment Guidelines

Decision to perform HLA typing

Factors favoring HLA typing*

- Estimated whole body dose > 3 Gy
- Neutrophil count < 100/ μ l by day 6 (see slide 26)
- Rapid drop of platelets (see slide 27)
- Expected to survive other injuries

Expedited HLA typing will be available using buccal swab, with high resolution DNA typing of HLA-A, -B, -C, -DRB1, and -DQB1

*Guidance for obtaining HLA-typing can be obtained by contacting the NMDP or the closest RITN center:
• NMDP HLA-typing guidance: 1 (800) MARROW2 or (612) 627-5800
• For an updated map and list of RITN centers: <http://www.ritn.net/About/>
• RITN Participating Centers General Contact Directory: <http://www.ritn.net/Contact/>

33 Check www.RITN.net for updates to these guidelines.

Ver. Mar 2016



Radiation Injury Treatment Network Acute Radiation Syndrome Treatment Guidelines

Contents

- Principles of ARS management at RITN centers
- Altered standards after a nuclear detonation
- Acute Radiation Syndrome
- Casualty triage after a nuclear detonation
- ARS management
- Stem cell support: when to HLA type casualties
- Additional Resources

2 Check www.RITN.net for updates to these guidelines.

Radiation Injury Treatment Network Acute Radiation Syndrome Treatment Guidelines

Decision to recruit a donor for evaluation

Factors favoring recruitment of a donor

- Bone marrow is aplastic at 2 sites >14 days after exposure
- Neutrophil count < 100/ μ l after 5 days of myeloid cytokine therapy
- Expected to survive other injuries
- Suitable donor is available:
 - 8/8 match (HLA-A, B-C, DRB1) using bone marrow or PBSCs
 - Alternatives, if a matched donor is unavailable:
 - At least 4/6 matched umbilical cord blood of adequate cell number
 - Haploidentical donor
 - Mismatched, related or unrelated donor with T-cell depletion

34 Check www.RITN.net for updates to these guidelines.

Ver. Mar 2016



Referral Guidelines: www.RITN.net/treatment



Guidelines for Identifying Radiation Injury and Considering Transfer to a Specialized Facility

Purpose: to provide hospitals with a concise guide for identifying casualties in the aftermath of a radiation incident who may have received a clinically significant dose of radiation.

Regional RITN hospital contact information for specialized consultation:

Hospital Name:

Department:

Phone:

E-mail:

Overview: Ionizing radiation affects the hematopoietic system even at very low doses; hematology and oncology medical staff treat these effects daily. Irradiated patients may develop severe organ dysfunction over time and require intense and specialized management.

For extensive information on the acute radiation syndrome (hematologic, gastrointestinal, cutaneous, central nervous system), types of radiation incidents, and radiation decontamination, see: www.remm.nlm.gov (Radiation Emergency Medical Management (REMM) website).

CONSULTATION/REFERRAL CRITERIA: Any patient suspected of having a radiation injury can be discussed with your local RITN center. The ability to accept referrals will depend on the size of the incident and the capacity of regional RITN center(s).

a. Criteria for considering RITN center consultation/referral include:

- i. Absolute neutrophil count less than 1,000/ μ L
- ii. Absolute lymphocyte count less than 1,000/ μ L
- iii. Severe nausea, vomiting and/or anorexia
- iv. A localized cutaneous radiation injury that requires extensive management
- v. Suspected or known internal contamination (e.g. involving a wound, the lung or GI tract)
- vi. Current facility not equipped to provide irradiated, leukoreduced blood products

b. Manage comorbidities and possible sequelae of irradiation:

- i. See www.ritn.net/Treatment/ for acute radiation syndrome treatment guidelines:

1. Transfuse only irradiated and leukocyte-depleted blood products



Medical Orders – on REMM.NLM.gov & RITN.net/treatment

Adult Medical Orders



Prototype for Adult Medical Orders During a Radiation Incident

Version: April 17, 2017

Cautions

- Authored by [REMM](#) and [RITN](#) physicians, this set of orders is a prototype only.
- **Orders must be customized for each patient and incident.**
- Specific drugs are suggested for function only. Patients may not need any/every category of drug listed.
- No HHS, CDC, FDA, or other US government entity endorsement of specific drugs or drug doses is intended or implied by inclusion in this order set.
- Consult the notes at the end of this document for additional, key information.

Internal contamination (decontamination treatments)

- This **Adult Orders Prototype** lists only FDA-approved medications as radioisotope countermeasures.
- Some, but not all of these drugs are currently in the [Strategic National Stockpile](#).
- Prescribers should consult the FDA drug label for complete prescribing information.
- Decontamination drugs should be used in children with great caution.
- The online version of REMM has additional recommendations about [additional countermeasure drugs that may be considered](#).
- This prototype does **not** address threshold levels of [internal contamination](#) that would trigger initiation, continuation, or discontinuation of decontamination treatment. See [REMM Countermeasures Caution and Comment](#), which discusses this issue.

Drug dosages

- All adult drug doses in this prototype are based on a 70 kg adult with normal renal and hepatic function.
- Appropriate dose adjustments should be made based on age, weight, drug-drug interactions, nutritional status, renal, and hepatic function.

- After a mass casualty incident, practitioners may encounter counterfeit drugs. This

Pediatric Medical Orders

Prototype for Pediatric Medical Orders During a Radiation Incident

Version: April 17, 2017

Cautions

- Authored by [REMM](#) and [RITN](#) physicians, this set of orders is a prototype only.
- **Orders must be customized for each patient and incident.**
- Specific drugs are suggested for function only. Patients may not need any/every category of drug listed.
- No HHS, CDC, FDA, or other US government entity endorsement of specific drugs or drug doses is intended or implied by inclusion in this order set.
- Consult the notes at the end of this document for additional, key information.

Internal contamination (decontamination treatments)

- This **Pediatric Orders Prototype** lists only FDA-approved medications as radioisotope countermeasures.
- Some, but not all of these drugs are currently in the [Strategic National Stockpile](#).
- Prescribers should consult the FDA drug label for complete prescribing information.
- Decontamination drugs should be used in children with great caution.
- The online version of REMM has additional recommendations about [additional countermeasure drugs that may be considered](#).
- This prototype does **not** address threshold levels of [internal contamination](#) that would trigger initiation, continuation, or discontinuation of decontamination treatment. See [REMM Countermeasures Caution and Comment](#), which discusses this issue.

Training: Medical Grand Rounds on RITN.net/training



Medical Grandrounds: Medical Response to Radiation Exposure: the Role of Hematologists

Rev. March 2016

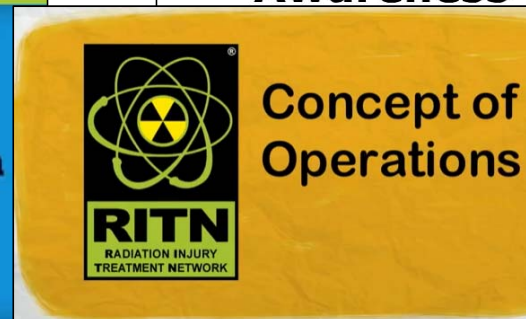
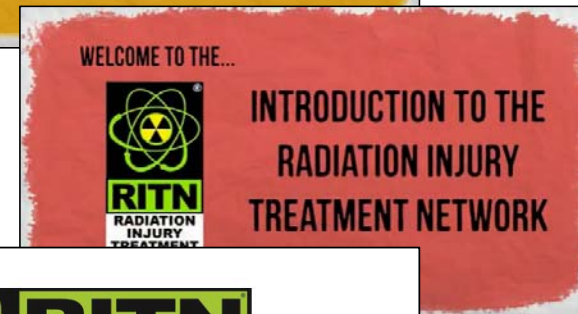
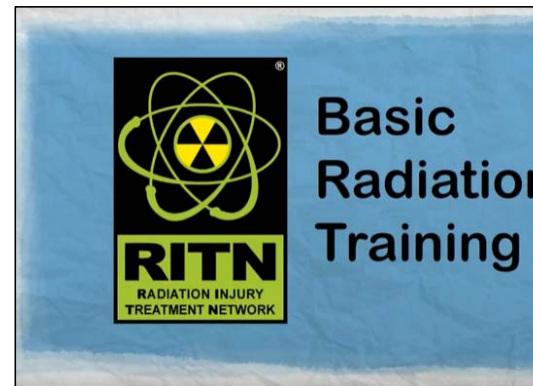
Agenda

- Radiation Injury Treatment Network
- Radiological Event Scenarios
- Radiation Biology
- Dosimetry
- Acute Radiation Syndrome
- Mitigation and Treatment
- Available resources

Web Based Training on RITN.net/training (FREE TRAINING)

- Web based training
 - Intro to RITN
 - Basic Radiation Training
 - RITN Concept of Operations
 - Radiation Safety Communication
 - GETS Card 101
 - Satellite Telephone 101
 - Non-Medical Radiation Awareness Training (ESL)
- Medical Grand Rounds training

Adopted by NNSA
for USAID training



Exercise Materials on RITN.net/exercises

- SITMANs & AARs
 - Tabletops, full scale and functional exercises
 - 12 years of exercise materials

Full-Scale Exercises (FSX)

*NOTE: All RITN center full-scale exercises are not an 'exercise-in-a-box.' Due diligence is required by the user. The exercises are materials pertinent to the user. The exercises are used by institutions for better preparedness. We only ask that you use them.

- 2012 Memorial Sloan Kettering Cancer Center
 - [Controller/Evaluator Handbook](#)
 - [Exercise Concept of Operations](#)
 - [Exercise Plan - Draft](#)
 - [Master Inject Form](#)
 - [Player Guide](#)
 - [Victim Card Blank](#)

- 2013 Mayo Clinic Rochester
 - [Controller/Evaluator Handbook](#)
 - [Evaluation](#)
 - [Exercise Plan](#)
 - [MSEL](#)
 - [Player Information](#)

- 2014 Dana Farber Cancer Institute
 - [Clinician Playbook](#)
 - [Exercise Plan](#)
 - [After Action Report \(AAR\)](#)

Regional TTX

Tabletop Exercises (TTX)

*NOTE: Raw data available to appropriate facilities upon request.

- [2006 RITN Tabletop exercise scenario and questions](#)
- [2007 RITN Tabletop exercise scenario and questions](#)
- [2008 RITN Tabletop exercise scenario and questions](#)
- [2009 RITN Tabletop exercise scenario and questions](#)
 - [2009 RITN Tabletop exercise results - charts](#)
- [2010 RITN Tabletop exercise scenario and questions](#)
 - [2010 RITN Tabletop exercise results - charts](#)
- [2011 RITN Tabletop exercise scenario and questions](#)
 - [2011 RITN Tabletop exercise results - charts](#)
- 2012 RITN Tabletop exercise scenario and questions ([PDF](#))
- 2013 RITN Tabletop exercise scenario and questions ([PDF](#))
 - 2013 RITN TTX Executive Summary ([PDF](#))
- 2014 RITN Tabletop exercise scenario and questions ([PDF](#))
 - 2014 RITN TTX Executive Summary ([PDF](#))



RITN Midwest Coordination & Treatment of a Radiation Mass Casualty Incident Tabletop Exercise

After-Action Report/Improvement Plan
August 2013

Big Rad Apple
10 Kiloton Nuclear Explosion
Regional Radiation Injury Treatment Network Tabletop Exercise
June 23, 2014

AFTER ACTION REPORT/IMPROVEMENT PLAN

FINAL DRAFT – August 21, 2014



www.RITN.net

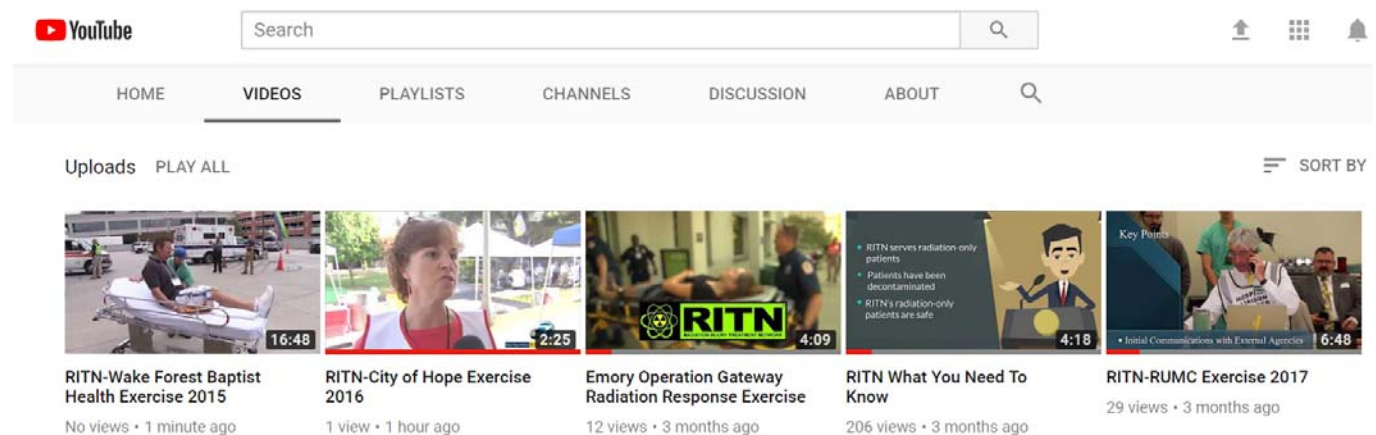


RITN YouTube Channel

- RITN What You Need to Know ([Video](#)): 4 min overview video

+

- Exercise videos



Background on NMDP and CIBMTR Data Collection

U.S. Department of Health and Human Services

HRSA Health Resources and Services Administration
Blood Cell Transplant

BC Home Transplant Resources Donor Information Cord Blood Information Research, D

Advisory Council Legislation & Contracts **Contractors** Content Inventory Radiation Injury Treatm

[BC Home](#) > [About](#) > [Contractors](#) > [National Marrow Donor Program](#)

National Marrow Donor Program, a Program Contractor

The National Marrow Donor Program® (NMDP), also known as Be The Match®, holds three of the contracts for the C.W. Bill Young Cell Transplantation Program (the Program):

- Office of Patient Advocacy/Single Point of Access
- Bone Marrow Coordinating Center
- Cord Blood Coordinating Center

The NMDP has operated under Federal contract beginning in 1987 through the National Bone Marrow Donor Registry (NBMDR), and since September 2006 through the Program.

U.S. Department of Health and Human Services

HRSA Health Resources and Services Administration
Blood Cell Transplant

BC Home Transplant Resources Donor Information Cord Blood Information **Research, D**

Transplant Outcomes & Data Cord Blood Units for Research Donor Registry Data Citation Guidelines

[BC Home](#) > [Research, Data, & Outcomes](#)

Research, Data, & Outcomes

Improving the lives of patients by collecting medical data, doing more research, and exploring new ideas.

The C.W. Bill Young Cell Transplantation Program (Program) helps patients who need a potentially life-saving bone marrow or umbilical cord blood transplant. One part of this Program focuses on the behind-the-scenes details that are critical to helping patients:

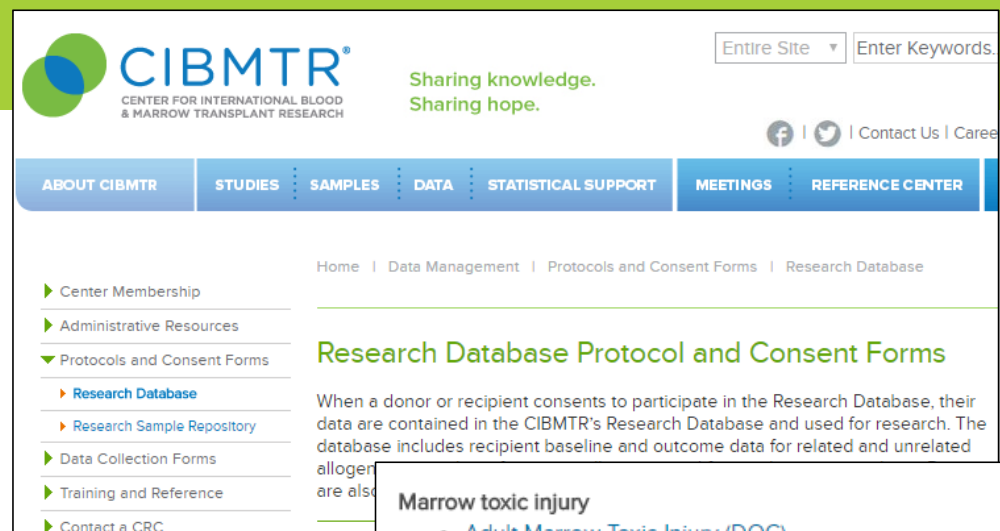
- Collecting and analyzing data about patients who have received a transplant
- Bringing together doctors, medical experts and scientists to discuss new transplant-related ideas
- Examining the best ideas through research studies

A bone marrow or cord blood transplant replaces diseased blood-forming cells with healthy cells. When a person has a life-threatening disease, such as leukemia, lymphoma, or an inherited metabolic or immune

- [Transplant Outcomes and Data](#)—Read reports and view graphs about patient outcomes and the numbers of transplants performed.
- [Registry Data](#)—View annual information about potential donors and donated cord blood units on the donor registry of the C.W. Bill Young Cell Transplantation Program, also called the Be The Match Registry®.
- [Cord Blood Units for Research](#)—Researchers can find a listing of cord blood banks that provide cord blood units for pre-clinical and clinical research.

Data Collection

- Since 2006 have maintained Marrow Toxic injury consent protocols and forms for patients treated at RITN hospital
- These are approved locally by each hospitals Institution Review Board
- Released web based data collection forms in 2015



www.RITN.net

Data Collection

- These are research forms
- Not for real-time
- Baseline form is 263 questions (11 pages)
- Forms are accessed through web based system
- Data managers at hospitals enter data
- Follow-up form is collected at 100 days, 180 days and annually for life



Form 5000 R1.0: RITN Baseline Form

Center: _____ CRID: _____

Key Fields

Sequence Number: _____

Date Received: ____-____-____

CIBMTR Center Number: _____

CIBMTR Research ID: _____

Event date: ____-____-____

Patient Information

1 Date of arrival at RITN center: ____-____-____

Specify patient height and weight at time of arrival to RITN center:

2 Height: _____ ☐ inches ☐ centimeters

3 Weight: _____ ☐ pounds ☐ kilograms

4 Ethnicity

☐ Hispanic or Latino

☐ Not Hispanic or Latino

Baseline Form Sections

- Demographics
- Co-Morbid Conditions
- Radiation Exposure Information
- Patient Trauma and Illness
- Organ Function
- Complete Blood Count (CBC)
- Lymphocyte Analysis
- Therapy and Infection Prophylaxis

Patient Trauma / Illness	
88	Did the patient experience any trauma / injuries as a result of the radiation incident? ☐ Yes ☐ No
89	Head (include brain) ☐ Yes ☐ No
90	Specify severity ☐ Minor ☐ Moderate (potentially life threatening without appropriate treatment) ☐ Severe (potentially life threatening even with treatment) ☐ Unknown
91	Abdomen ☐ Yes ☐ No
92	Specify severity ☐ Minor ☐ Moderate (potentially life threatening without appropriate treatment) ☐ Severe (potentially life threatening even with treatment) ☐ Unknown
93	Pelvis ☐ Yes ☐ No

Patient Trauma / Illness	
77	What was the marrow toxic incident type? ☐ Improvised nuclear device (IND) / military nuclear weapon ☐ Radiological exposure device (RED) (e.g. Open source) ☐ Radiological dispersal device (RDD) (e.g. Dirty bomb) ☐ Nuclear power plant accident ☐ Industrial / workplace accident ☐ Chemical (e.g. Mustard agent) ☐ Unknown
78	Was the patient pregnant at the time of exposure? (Female only) ☐ Yes ☐ No ☐ Unknown
79	Did the patient have internal contamination? ☐ Yes ☐ No ☐ Not Applicable (e.g. RED) ☐ Unknown

External Dose Estimation (1)	
81	Was external dose estimation given as a specific value? ☐ Yes ☐ No
82	_____ ☐ Sv ☐ Gy ☐ cGy
83	Was external dose estimation given as a range? ☐ Yes ☐ No
84	_____ - _____ ☐ Sv ☐ Gy ☐ cGy
85	Specify method used to estimate external dose from exposure ☐ Lymphocyte depletion kinetics ☐ Time to onset of vomiting ☐ Prodromal symptoms ☐ Chromosome analysis (dicentric) ☐ Other method
86	Specify other method: _____

If you do one thing following this presentation

Download the REMM phone App or the entire site to your computer

www.REMM.NLM.gov

