

Large Scale Testing for ARS after an IND Detonation

AMESH ADALJA MD FIDSA FACP FACEP
@AMESHAA

AADALJA1@JHU.EDU

The Problem: Testing 1 million People

- ▶ Potentially thousands of people will be exposed to survivable doses of ionizing radiation
- ▶ They will suffer from ARS unless medical interventions are initiated
- ▶ How are these patients identified rapidly and accurately?
- ▶ In a major city, modeling estimates 100,000 people may be exposed
 - ▶ Testing 1 million people may be necessary to identify those at highest risk
 - ▶ Non-specific early symptoms
 - ▶ “Worried well”
 - ▶ Geographic information not sufficient at early stage

Table 1. Radiation Dose and ARS Syndrome^{6,21}

<i>Radiation Dose</i>	<i>Syndrome</i>	<i>Prognosis</i>
1-8 Sv	Hematopoietic	Potentially survivable
8-30 Sv	Gastrointestinal	Fatal
>30 Sv	Cardiovascular	Fatal
>30 Sv	Central nervous system	Fatal

Possible Methods

- ▶ Time to vomiting
 - ▶ Most exposed to 2 Sv dose will vomit within 4 hours (sensitive)
 - ▶ Non-specific
 - ▶ Psychological factors, head trauma, ear drum rupture, etc
- ▶ Electroparamagnetic spin resonance of dental enamel
 - ▶ Ideally performed on extracted teeth
- ▶ Stress gene and protein signature
- ▶ Metabolomics (urine)
- ▶ Ocular albumin

Chromosomal Dicentrics

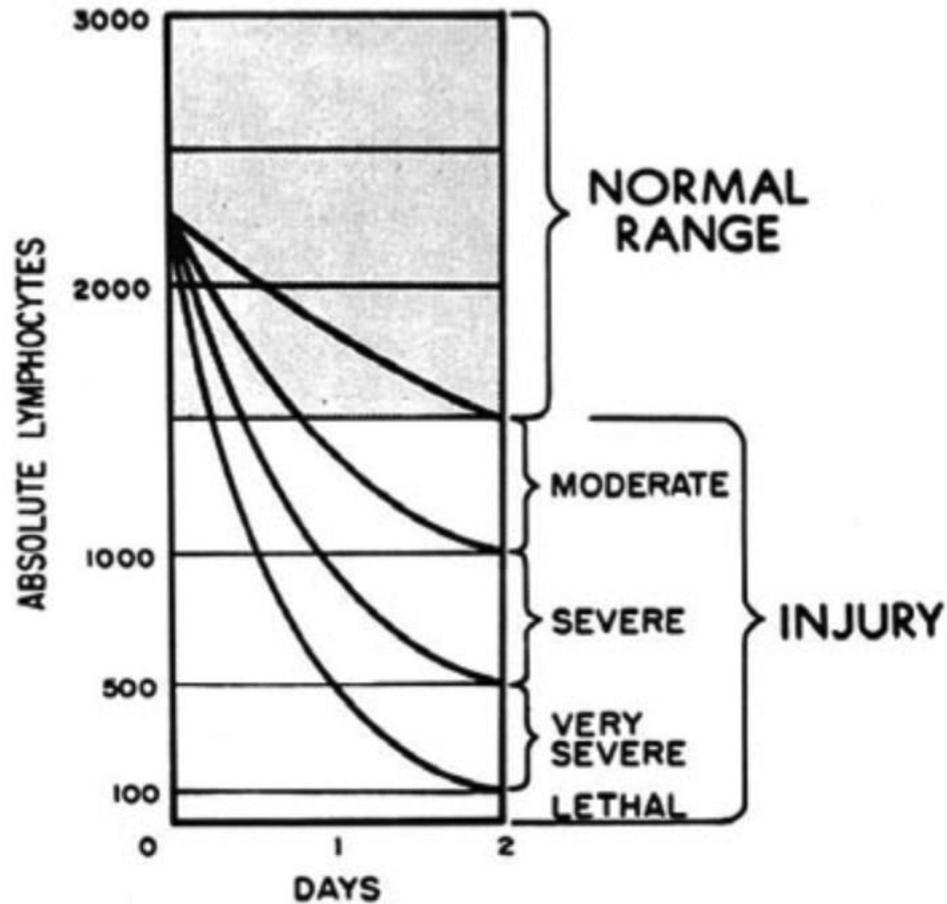
Gold standard

Not performed in most laboratories

Specially trained personnel

Capacity to do on a massive scale does not exist *today* and will not exist for s

Andrews Lymphocyte Nomogram



Source: Andrews GA, Auxier JA, Lushbaugh CC. The Importance of Dosimetry to the Medical Management of Persons Exposed to High Levels of Radiation. In Personal Dosimetry for Radiation Accidents. Vienna: International Atomic Energy Agency, 1965.

ALC

ALC: Advantages

- ▶ Performed in all laboratories as part of CBC/d
- ▶ Automation
- ▶ No special training of technicians

Who would perform ALCs?

- ▶ After an IND detonation local hospital labs may be destroyed
- ▶ Receiving hospitals' labs may be overwhelmed with medical surge (trauma, evacuated patients, etc)
- ▶ Need for ability to track/match results with patients as they may have traveled outside the metropolitan area

National Laboratory Chains

A POSSIBLE APPROACH TO LARGE-SCALE LABORATORY TESTING FOR ACUTE RADIATION SICKNESS AFTER A NUCLEAR DETONATION

Amesh A. Adalja, Matthew Watson, Samuel Wollner, and Eric Toner

aircraft

→ Together both possess the capacity to do 1 million ALCs in a 24 hour period

→ Both have extensive internet portals that allow patient tracking of results

▶ Some states require Rx for labwork