




# Models Matter!

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**M.H. Chew & Associates, Inc.**  
Environmental, Safety and Health  
Engineering, Radiation Protection and Nuclear Safety

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$H_0$ : dose  $\neq$  risk  
 $H_{LNT}$ : as dose  $\uparrow$ , risk  $\uparrow$   
 $H_{AR}$ : at low doses  $\downarrow$  at high doses  $\uparrow$

## Don't Be A




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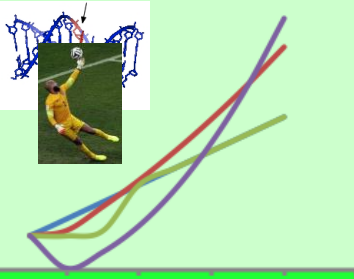
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## The Contenders

— LNT

— LQ

— Threshold

— Hormetic

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## "We Are **Not** Giving Ourselves Cancer"!!



### Diagnosis

- Blunt cancer survival
- Shortened hospital stays
- Standard treatments
- Cardiac treatment

Source: <http://www.nytimes.com/2014/01/31/opinion/we-are-giving-ourselves-cancer.html>

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Predictions of hypothetical cancer incidence and deaths in patient populations exposed to such low doses are highly speculative and should be discouraged.

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**SPR** The Society for Pediatric Radiology

...the radiation used in CT scans has not been proven to cause cancer during a child's lifetime

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...the computation of cancer deaths based on collective effective doses involving trivial exposures to large populations is not reasonable and should be avoided

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## Welcome to the Club!



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## Disaster in Japan



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## Sunshine or A Lump of Coal?

"...global nuclear power has prevented an average of 1.84 million air pollution-related deaths..."

(Karecha and Hansen, Environ Sci Tech 2013)




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## Reasonable?



15,887 dead



~1,600 dead



0 dead

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## Putting the "R" Back in ALARA

making every reasonable effort to maintain exposures to ionizing radiation as far below the dose limits as practical...

...taking economic and other societal considerations into account.

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## Why Take Two When One Will Do?




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## All Things Equal?

- Bryan Salinas fell 5 feet
- “A CT scan exposes a child to radiation equal to 300 X-rays, and can require sedation, which is risky” (American Academy of Pediatrics)
- **Bryan died hours later** from a subdural hematoma




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## All Things Are ≠

- Trading minimal dose for diagnostic quality
- Population ≠ individual
- Ignoring uncertainties
- Flawed logic
- Frightening patients
- Overweighting radiation risk

Source: (Brody and Guillerman, Thorax, 2014)

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## This Matters!!



### Doctors 'Shocked' by Radiation Overexposure at Cedars-Sinai

Medical Scans Continue Increasing Our Exposure to Radiation, Experts Say

By RADHA CHETAL  
ABC News Medical Unit  
Oct. 13, 2009

WORLD NEWS  
23 comments

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## Foot-O-Scope



**CERTIFICATE**

SHOE-FITTING TEST DATA FOR \_\_\_\_\_

1. ANKLE ROLL GOOD ☐ FAIR ☐ POOR ☐

2. WEIGHT DISTRIBUTION

LEFT	RIGHT		LEFT	RIGHT
% BALL	%		% BALL	%
% OUTER	%		% OUTER	%
% HEEL	%		% HEEL	%
RIGHT WAY	WRONG WAY		RIGHT WAY	WRONG WAY

3. X-RAY FITTING TEST

LEFT	GOOD	RIGHT
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
FAIR	WRONG WAY	
<input type="checkbox"/>	<input type="checkbox"/>	
POOR		

**This scientific way of approaching the problem of poorly-fitted shoes eliminates guesswork. Now you can see for yourself!**

7-14 R to the feet

Source: <http://www.orau.org/ptp/collection/shoefittingfluor/shoe.htm>

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## Baby ≠ Bathwater




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## What to Do?



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## Big Boy Pants



"A lie gets  
halfway around  
the world before  
the truth has a  
chance to get its  
pants on"

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**Medical Imaging  
Saves Lives !!!**

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