

# What's new and What is Coming: Other Diseases

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Planning Towards the BEIR VIII report

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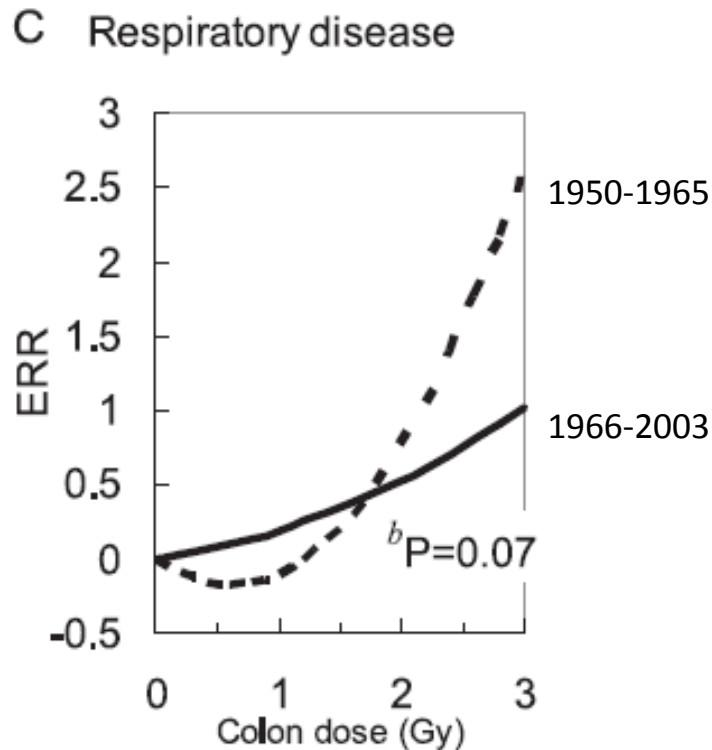
National Academy of Sciences

# Topics

- Respiratory and digestive disease
- Thyroid disease
  - Hypothyroidism
  - Nodules

# Respiratory disease in LSS

## LSS mortality report #14, 1950-2003



(Ozasa et al, RR, 2012)

- Mostly pneumonia & influenza
- Possibly different disease characteristics for early period vs. recent period

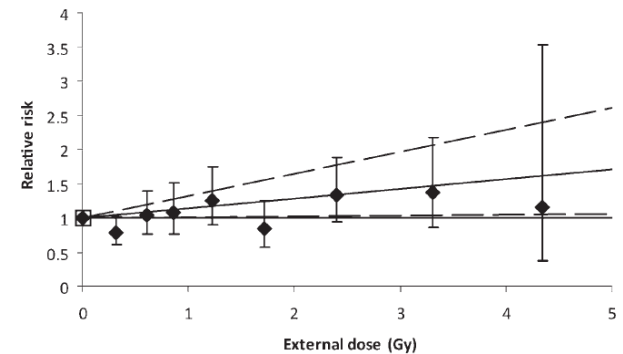
Adjustment for cancer/CVD co-morbidity reduces ERR/Gy from 0.17 to 0.11, though still significant.

(Pham et al, RR, 2013)

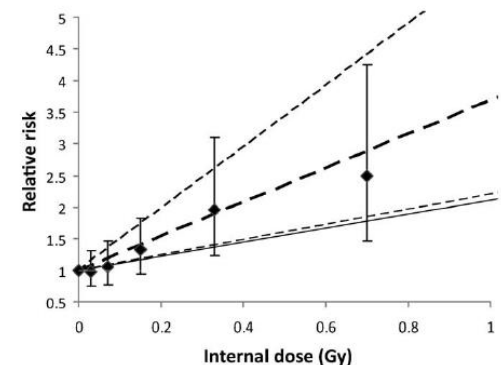
# Chronic bronchitis, Mayak

- Workers at Mayak plant followed up through 2005
  - Chronic bronchitis incidence, after 1960, ascertained from medical records with retrospective verification
    - Exceedingly high baseline rates before 1960
  - Adjustment made for smoking & other non-radiation factors
  - Significant linear dose response for external & internal doses
    - Adjusted for each other

External gamma irradiation



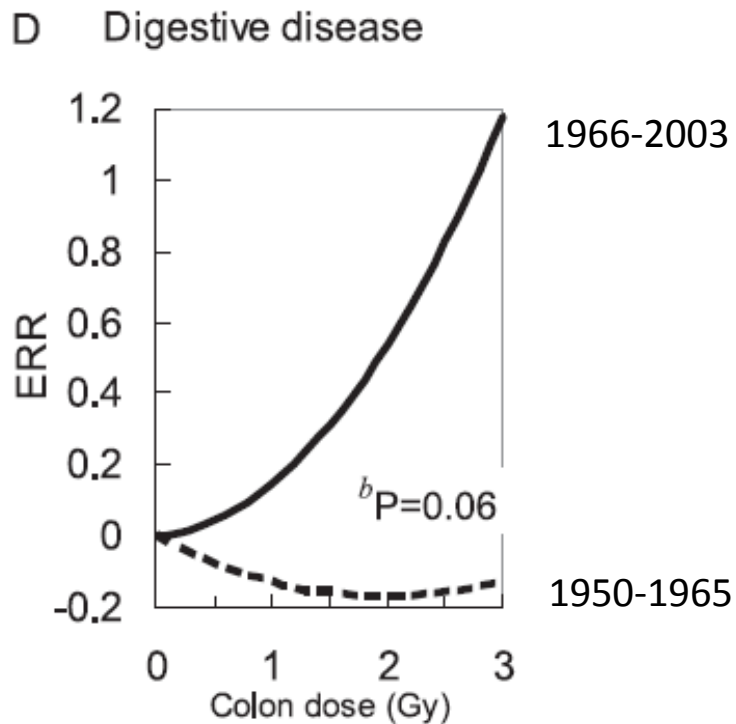
Internal alpha irradiation



(Azizova et al, RR, 2013)

# Digestive disease in LSS

## LSS mortality report #14, 1950-2003



(Ozasa et al, RR, 2012)

- Increased risk only in recent period
- Analysis on more specific disease categories underway?

### AHS (clinical) data

- Dose response for chronic liver disease and cirrhosis
- Partially explained by HBV/HCV infection among heavily exposed survivors

(Yamada et al, RR, 2004; Fujiwara et al, RR, 2000)

# THYROID DISEASE

# Hypothyroidism

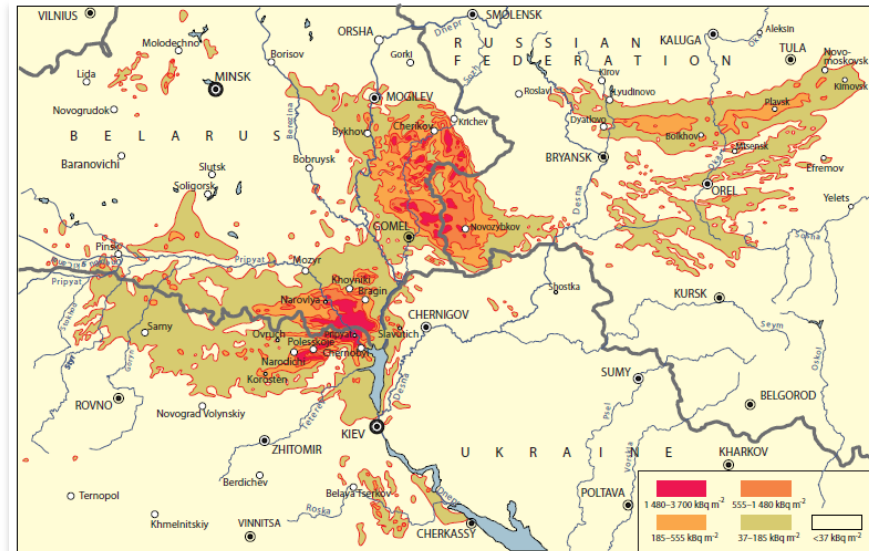
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- Previous data suggested hypothyroidism and/or elevated TSH levels following Chernobyl fallout exposure
  - No dose estimates & small sample size
- Little evidence from Marshall Islanders, Hanford & Mayak

# Thyroid screening cohorts exposed to $^{131}\text{I}$ in childhood/adolescence

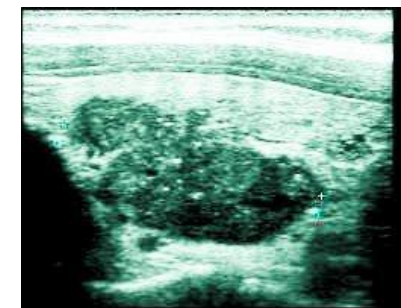
## Population-based cohorts in Ukraine and Belarus

- 25,000 exposed at ages 0-18 yrs
- Mean  $^{131}\text{I}$  dose: 0.65-0.68 Gy
- Thyroid radioactivity measurements
- Standardized periodic ultrasound thyroid screening



Radioactivity measurements

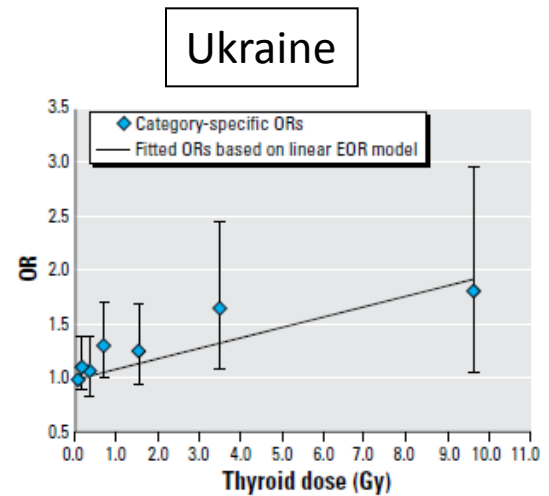
Ultrasound screening



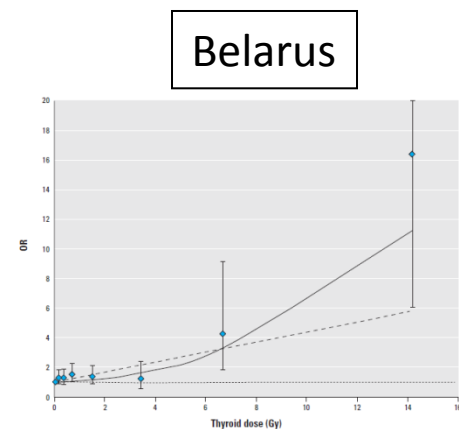


# Thyroid screening cohorts: Ukraine & Belarus

- Significant I-131 dose response for “subclinical” hypothyroidism at baseline screening
  - Continuous increase in TSH with increasing I-131 dose
- What are the long-term consequences?
  - A-bomb data suggest progression of subclinical to overt hypothyroidism (*Imaizumi et al, Thyroid, 2011*)
  - Longitudinal data from repeated screenings in Ukrainian Belarusian cohorts will be forthcoming



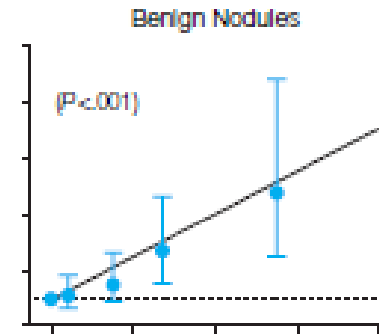
(*Ostroumova et al, EHP, 2008*)



(*Ostroumova et al, EHP, 2013*)

# Thyroid nodules

- A-bomb survivors
  - Increased risk of benign thyroid nodule  
(*Imaizumi et al, JAMA, 2006*)
  - Increased risk of thyroid cancer subsequent to nodules – small numbers  
(*Imaizumi et al, JCEM, 2005*)
- I-131 exposure
  - Ozyorsk residents (*Muchkacheva et al, RR, 2006*); Semipalatinsk residents (*Land et al, RR, 2008*)
  - New results expected from Ukrainian & Belarusian screening cohorts



# Why non-cancer thyroid diseases?

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- More common than thyroid cancer
- Detected by screening after radiation accidents and medical follow-up

# Summary points

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- Observed excess respiratory disease risk may largely be due to confounding & misclassification, but the residual excess is significant and remains to be explained.
- The nature of observed excess digestive disease is still unclear.
- Clinical consequences of excess non-cancer thyroid diseases need to be clarified.