Guidelines for Determining the Probability of Causation under the U.S. Energy Employees Occupational Illness Compensation Program Act (EEOICPA) of 2000

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INTRODUCTION

Guidelines for Determining Probability of Causation (42CFR Part 81)

- Based on the cancer risk models developed by the National Institutes of Health (NIH) in 1985.
- Cancer risk models updated by a joint workgroup of the National Cancer Institute and the Centers for Disease Control and Prevention (CDC).
  - New cancer risk models are based on cancer incidence rather than cancer mortality.
- NIOSH-Interactive RadioEpidemiological Program (NIOSH-IREP) developed for probability of causation calculations.
  - Accounts for uncertainty associated with radiation dose and cancer risk models.
  - Radiation Effectiveness
  - Dose and Dose-Rate Effectiveness
- Provide the Department of Labor with systematic objective procedures for handling claims with unusual characteristics.
  - Multiple Primary Cancers
  - Primary cancer identification from secondary cancers

METHODS

Interactive RadioEpidemiological Program (NIOSH-IREP)

- Uses updated cancer risk models including uncertainty from epidemiologic data.
- Includes 33 cancer types and accounts for:
  - Radiation Dose
  - Gender
  - Age of Exposure
  - Date of Cancer Diagnosis
  - Other Factors (smoking for lung)
- Probability of Causation is calculated by dividing the risk from radiation by the combined risk from radiation and background incidence.

$$PC = \frac{RadRisk}{RadRisk + BaseRisk} x100\%$$

- Radiation Effectiveness Factors
  - Account for differences in risk between leukemia and solid tumors from different radiation types and energies
  - 4 Radiation types with different energy intervals

Radiation Type	Energy
Photons	*< 30 keV*
	30-250 keV
	> 250 keV
Neutrons	*< 10 keV*
	10 – 100 keV
	100 – 2 MeV
	2 MeV – 20 MeV
	> 20 MeV
Electrons (Beta Particles)	*< 15 keV*
	> 15 keV
Alpha Particles	*All Energies*

- Dose and Dose Rate Effectiveness Factor (DDREF)
  - Uncertainty distribution for reduced risk from low-LET radiation received at a low rate.
  - Uncertainty distribution for increased risk from high-LET radiations received at a low rate *(inverse dose rate effect)*

Procedures for Multiple Primary Cancers

- Probability of causation for multiple cancers is calculated by determining the probability of causation for each cancer and then combining the probabilities as follows:

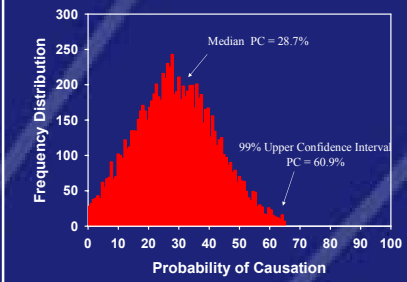
$$PC = 1 - [(1 - PC_{Cancer_1}) \times (1 - PC_{Cancer_2}) \times ...]$$

Primary Cancer identification from Secondary Cancers

- Guidelines based on evaluation of National Center for Health Statistics (NCHS) Mortality Database.
- For each secondary cancer, the set of primary cancers producing approximately 75% of the secondary cancer was identified.
- Final assignment of a primary cancer determined by the Department of Labor as the site among possible primary sites which results in the highest probability of causation.

DISCUSSION

- Determinations based on upper 99% confidence interval (credibility limit) of the probability of causation
- Minimizes the possibility of denying compensation to claimants with cancers likely to have been caused by radiation exposures



CONCLUSIONS

- Regulation provides a fair, reasonable, and science based approach by which the Department of Labor can determine whether an energy employees cancer was "at least as likely as not" (50% or greater probability) caused by radiation doses incurred in the line of duty.