Comparison of ICRP 30 Models to Newer Models

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INTRODUCTION

- Annual organ dose is needed for a compensation decision under the United States Energy Employees Occupational Illness Compensation Program Act (EEOICPA) of 2000.
- Internal doses have been calculated by various methods since the 1940s.
- The U.S. Department of Energy protection programs are currently regulated under ICRP 30 methods.
- Needed to compare ICRP 30 models to current ICRP models to determine effect of our dose calculation on the dose of record.

METHODS

- Evaluated inhalation exposures for Pu-239
- Used ICRP recommended particle sizes (1 micron ICRP 30 and 5 micron ICRP 66)
- Used Cindy© and IMBA-NIOSH© computer programs
- Compared annual and committed doses obtained from each model.
- Compared lung and metabolic organ doses as well as non metabolic organ doses.
- Compared doses for various solubility classes

RESULTS

New model compared to ICRP 30

<table>
<thead>
<tr>
<th>Organ</th>
<th>Committed Dose per Bq intake</th>
<th>Class</th>
<th>Class per Bq/day urine</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lung</td>
<td>0.14</td>
<td>S/Y</td>
<td>0.75</td>
</tr>
<tr>
<td>Liver</td>
<td>0.13</td>
<td>M/W</td>
<td>0.56</td>
</tr>
</tbody>
</table>

CONCLUSIONS

- Newer ICRP models calculated doses may be higher or lower depending on the situation.
- Difference is small for metabolic organs when dose is determined from bioassay.
- Newer models result in a much higher dose for non-metabolic organs.
- ICRP 66 lung model separates lymph node dose from lung dose. This allows proper risk coefficients to be applied.