

## $^{32}\text{P}$ PERSONNEL MONITORING IN U.S. RESEARCH INSTITUTIONS

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### ABSTRACT

Phosphorus-32 is used extensively in medical research. Because our  $^{32}\text{P}$  personnel monitoring costs are significantly increasing especially for low exposure potential  $< 37 \text{ MBq}$ , we surveyed 13 similar U.S. institutions to aid a review of our present badge policy. Our 3 year exposure data show that the extremities have a greater potential for exposure than the skin of the whole body. Despite significant costs, fifty-four percent of institution surveyed issued only a whole body badge for use  $< 37 \text{ MBq}$ . Liability and registration are reasons other than exposure potential to monitor at  $< 37 \text{ MBq}$ . Almost all issued a whole body badge and ring badge at  $37 \text{ MBq}$ .

### INTRODUCTION

#### BUMC MONITORING AND COSTS FOR $^{32}\text{P}$

Individuals using less than  $37 \text{ MBq}$  ( $1 \text{ mCi}$ ) of  $^{32}\text{P}$  are issued a commercial TLD finger ring badge worn name side at the palm to assess extremity dose. Individuals using  $37 \text{ MBq}$  or more of  $^{32}\text{P}$  are also issued a whole body film badge to assess the dose to the skin of the whole body.

In reviewing 3 years of exposure data for  $^{32}\text{P}$  users through December 1989, the highest annual whole body badge dose was  $5.1 \text{ mSv}$  ( $510 \text{ mRem}$ ). For our ring badges, 25% had positive readings above the minimum detectible exposure at  $< 37 \text{ MBq}$   $^{32}\text{P}$  use and 32% positive at  $37 \text{ MBq}$  and above. Our whole body badges had 12% positive exposures at  $37 \text{ MBq}$  and greater.

From 1987 to 1989, our  $^{32}\text{P}$  badge costs have doubled accounting for 55% of all badges issued for radioisotopes. In 1990, our annual badge cost was over \$12,000 with approximately 35% of these costs due to issuing badges for  $^{32}\text{P}$  use less than  $37 \text{ MBq}$ .

### SURVEY

Our office contacted by telephone the health physics offices of 13 selected institutions throughout the United States known to have large broad scope or broad medical radioisotope licenses. These institutions were asked their policy for personnel monitoring of persons using only  $^{32}\text{P}$ .

## SURVEY RESULTS

Of the 13 institutions surveyed, 69% issued whole body badges for  $^{32}\text{P}$  use < 37 MBq. At the 37 MBq level, 100% of the institutions surveyed issued a whole body badge and 77% issued a ring badge. At the 37 MBq level, four institutions that did not issue a badge at less than 37 MBq did issue a whole body badge and ring badge at the 37 MBq level, suggesting this as an action level for personnel monitoring.

Reasons given for issuing badges at < 37 MBq include: assess exposure potential, registration and protection from liability. Reasons for not issuing badges at < 37 MBq include: cost, low exposure potential, and because their health physics department surveys  $^{32}\text{P}$  use.

Some institutions were unclear whether the whole body badges were assessing whole body  $^{32}\text{P}$  exposure or skin of the whole body exposure.

## CONCLUSION

1) Phosphorus-32 exposures at less than 37 MBq (1 mCi) appear to have a low exposure potential to researchers and are not likely to approach the current USNRC criteria of monitoring at 25% maximal permissible dose. However, determining what that dose is, i.e., skin vs. whole body, is not entirely clear from this preliminary survey of 13 institutions. In our opinion, the skin is at risk and the skin dose limit should apply.

2) The majority of the institutions surveyed issued a whole body film badge for less than 37 MBq  $^{32}\text{P}$  use and a whole body film badge with a TLD ring badge at 37 MBq or greater  $^{32}\text{P}$  use. There was a greater degree of uniformity in personnel monitoring for  $^{32}\text{P}$  at levels of 37 MBq and greater.

3) Liability and registration are reasons other than exposure potential that some institutions issue a whole body badge to investigators using less than 37 MBq.

4) Should an institution decide to issue a badge for  $^{32}\text{P}$  use under 37 MBq, it would be more appropriate to issue a ring badge worn with the name side at the palm to monitor extremity dose than to issue a whole body badge (32% versus 12% positive).

5) Should an institution decide to issue a badge for  $^{32}\text{P}$  use under 37 MBq, the costs may be significant.

## REFERENCES

1. USNRC, 1990, Code of Federal Regulations, Washington, D.C.: U.S. Government Printing Office; 10 CFR Part 20.
2. Evdokimoff, Victor, 1991, Phosphorus-32 Personnel Monitoring in Research Institutions, Health Physics 61, pp. 275-278.