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Discussion, Conclusions, & Recommendations

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Description

Discussion of a student's project about research safety in laboratories prompted by her job as a new researcher in the laboratory where safety precautions were ignored.

Body

Discussion

- How does an individual asses the hazards of working with a particular chemical?
- Why is ethidium bromide described in safety literature as a dangerous substance, never to be disposed of in the garbage if it is done regularly?

Dismissing the 7.02 safety guidelines as overexaggerations propagated by OSHA and the 7.02 staff is an easy explanation for these incongruities. However, unlike most carcinogens, the method by which EtBr causes cancer is actually known. It has a flat, ringed structure, and has residues that can form weak bonds with portions of DNA. When it comes in contact with DNA, it can slide between two of the rungs of the DNA "ladder" and hinder replication. Its presence greatly increases the chance

that mistakes will be made when the DNA is copied before the cell divides. The more mistakes made in replication, the more of a chance one of those mistakes will give rise to a cell that cannot regulate its division, giving rise to cancer.

When I learned this, I suddenly became much more concerned about ethidium bromide. I pictured a molecule of EtBr intercalating in my DNA rungs, changing the usually reliable process of replication, and mutating my cells. The idea is certainly frightening, and because of this I personally cannot simply dismiss the safety precautions described in the 7.02 guidelines. After talking with researchers, I have seen several steps that one could take to address a safety concern about EtBr, but the dilemma here was in deciding when something is really a risk. The range of responses was considerable-I was very surprised to find that Brenda considered throwing the gels in the trash "standard practice", while Paul said he would quit if something wasn't done. If I had some more time, I would have liked to interview a specialist on carcinogens to see how dangerous he or she thought the EtBr was in the concentrations being used in these gels. I expected my scenario to be something that would happen once in a while in a lab, but it seems that in most labs it happens all the time and isn't even considered a safety risk.

After these interviews, two possible causes for this attitude about EtBr I noticed were desensitization to everyday dangers, and pressure to conform with coworkers. In my interviews, particularly in Brenda and Martha's lab, I had the impression that the newer workers were generally more afraid of EtBr than people who had been there for a while. Brenda especially seemed very desensitized to the EtBr she dealt with almost daily. My explanation for this is that is it probably extremely difficult to perceive something as a risk when it looks like water (poses no immediate physical danger), and you see it every day. Also, radiation is taken so seriously it almost seems like the only important safety hazard. Researchers who took extra precautions were seen as inexperienced because they had not been desensitized to these risks. This would seem to create some pressure for those people to dismiss their ideas about what is dangerous and conform to the practices of coworkers. Coworkers teach each other more about safety practices than OSHA guidelines or chemical labels, and if someone in charge has the wrong idea about how dangerous something is, they may influence others in the same way.

Overall, I feel that this project has been very informative not only about the safety networks available to researchers, but about how laboratories are run and

managed. One problem with my study is that the only profit-based lab I could get an interview in was also a biomedical lab, not a genetic research lab like the academically-funded labs I interviewed. However, I did see some differences which I feel might have something to do with the funding source. First, the academic labs appeared more autonomous than the biomedical lab, and seemed to handle their affairs privately as much as possible. At the hospital, Paul was very concerned with both OSHA and the FDA, while at the Medical Schools the researchers told me that the P.I. has considerable influence over safety practices and was not influenced directly by any agency. Martha didn't even know what OSHA was until I told her. Since the profit-based lab had to meet FDA guidelines to make their work worthwhile, they had a built-in interest in safety. On the other hand, the company has a larger interest in making a profit, and safety concerns seemed to be there for the FDA more than for the workers. Also, the lab employees at the hospital were in the dark about exactly what they were researching. The way the labs are managed does seem to have some implications in how they handle safety.

Conclusions and Recommendations

The goal of this project was not to determine exactly how hazardous EtBr is- I'll probably never really know the answer to that question- but to see how people make decisions about chemicals, and what the best course of action would be. I think in this case there is enough information about EtBr to convince me it's not something I want to touch or throw in a landfill, even diluted. Most people who work with EtBr would not feel this way. After completing this project, I think the best course of action for someone in my scenario would be to use the recommended disposal practices listed for EtBr on its package, and to work to encourage everyone in the lab to do the same. In my opinion, the person involved should speak with coworkers first, then the supervisor, the safety officer, and finally go outside the lab to report to the safety office. Consequences of this action are not trivial; it would potentially bring the distrust and scorn of coworkers, since they would probably see the changes as an inconvenient and unnecessary. In order to avoid these problems, I think the government should work to enforce their regulations even more, especially in academically funded labs. While I realize this would create more inconveniences, someone has to take responsibility for keeping track of the total amount of chemicals that end up in our landfills and down the drains. Also, researchers need some motivation to keep their respect for carcinogens they use

daily, and prevent these hazards from failing into the shadow of the radiation dangers. In summary, decisions about how to handle a chemical were influenced not only by what is printed on the box or in safety guidelines, but also to a large extent by examples of coworkers, willingness to assume personal risk, desensitization to everyday dangers, and the attitude of supervisor. Safe practices are not always obvious, and people must use their own professional judgment about what is safe for themselves and for the environment.

Continue to the Appendix

Notes

Author: Gwen Crevensten, Real World Ethics 2.95j, May 1995.

Rights

Resource Type

Case Study / Scenario

Topics

Lab and Workplace Safety
Safety
Collaboration

Discipline(s)

Chemistry
Life and Environmental Sciences
Research Ethics