Moving from Compliance to Safety in UC Laboratories:

A Faculty Perspective on Where We Came From and Where We Are Going

Craig Merlic

UCLA Department of Chemistry and Biochemistry

UC Center for Laboratory Safety

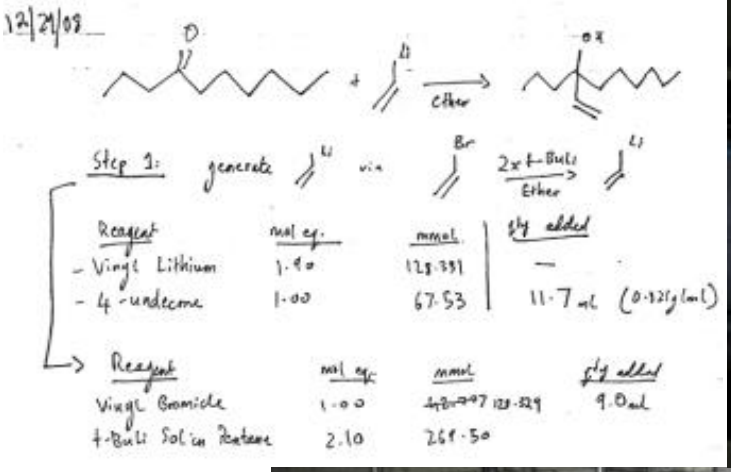
UCLA

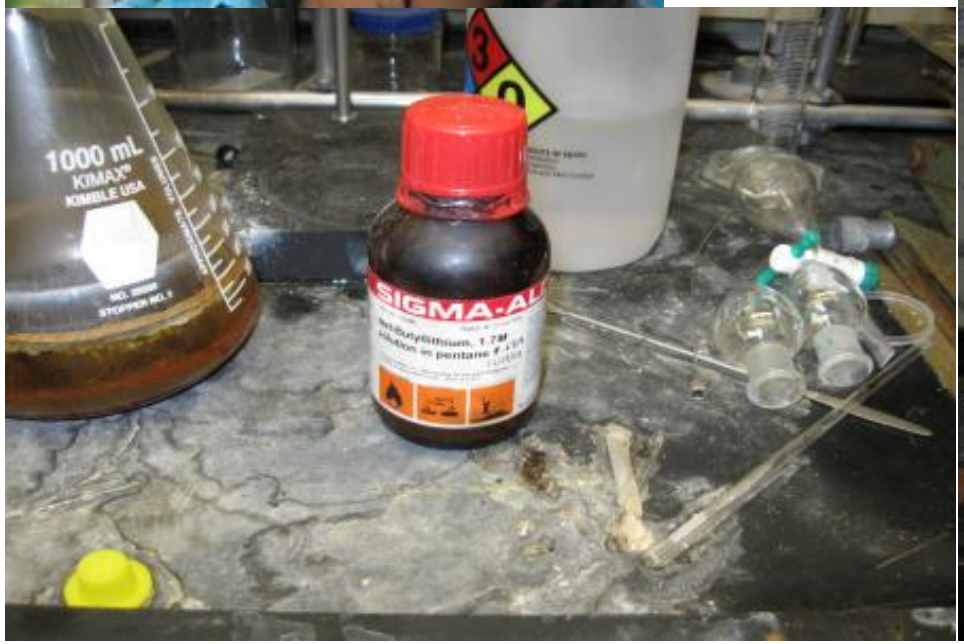
SAFETY TRAINING CONSORTIUM

UC Center for Laboratory Safety

December 29, 2008

Sheharbano Sangji





Accident Aftermath

Repercussions across

- UCLA campus
- University of California system
- Chemistry departments and universities nationwide
- Federal agencies
- Professional societies

A very tragic accident that has had true impact improving academic safety practices and the culture of safety

UCLA Response

UCLA initiated a wide array of changes and activities in response to the accident, Cal/OSHA inspections, and legal fillings.

- Chancellor
- Vice Chancellor for Research
- Associate Vice Chancellor for Research – Laboratory Safety
- UC Center for Laboratory Safety
- Laboratory Safety Committee
- Environment, Health and Safety
- Departments
- Faculty
- Research Staff
- Graduate Students and Undergraduate Students

Changes top to bottom were required to change the safety culture

Initial Faculty Response

A wide array of perspectives from research faculty

- **“A real tragedy”**
- **“I hadn’t considered that immediate cause”**
- **“My students perform very similar procedures”**
- **“It could have happened in my lab”**
- **“I need to improve how my students are trained”**
- **“I need to monitor more closely what my students do”**
- **“Safety is the role of EH&S”**
- **“EH&S needs to do a better job of safety training”**

What changed since then and what are the key issues?

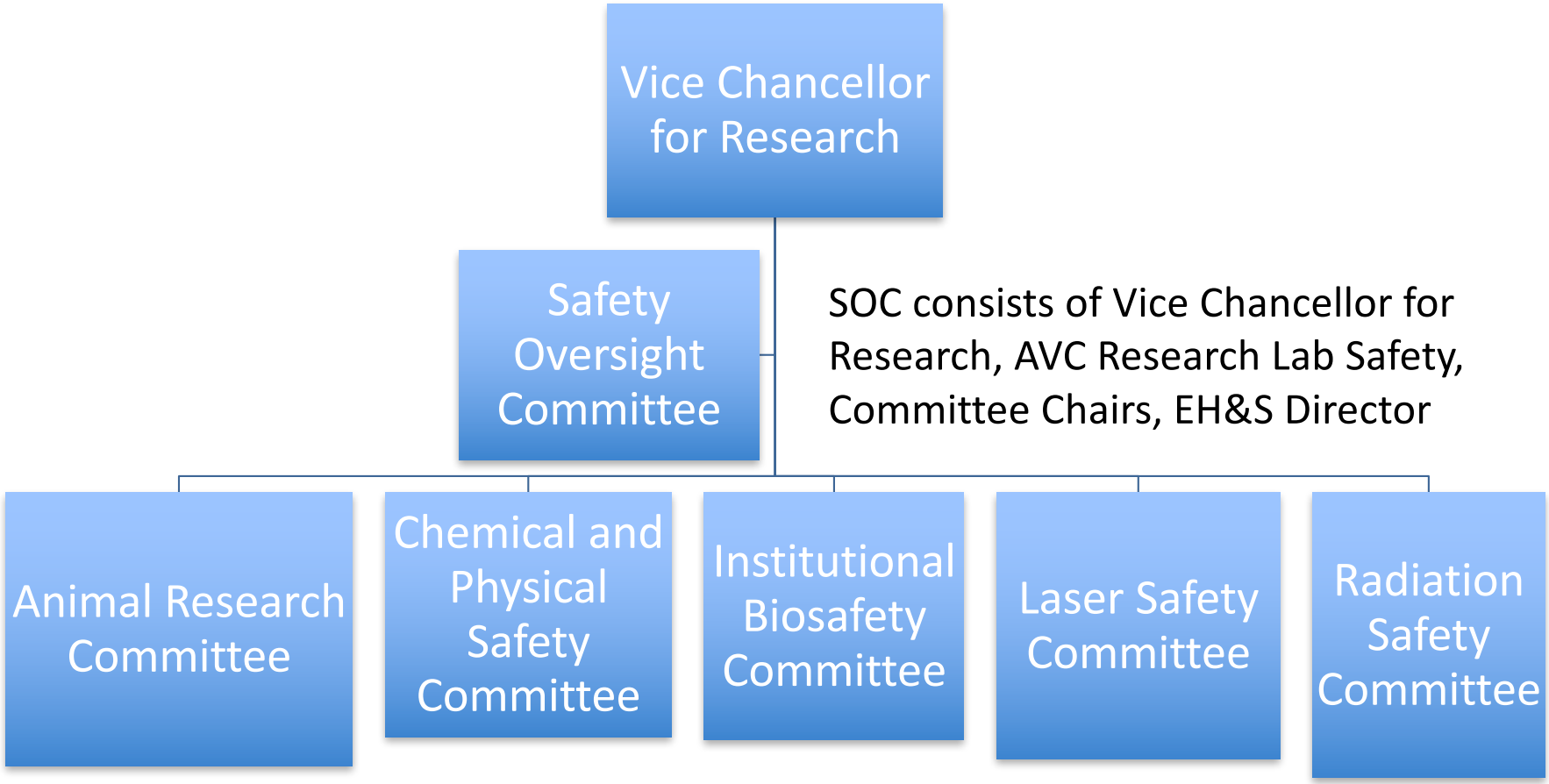
UC Faculty Response

- Required PI safety training – initial and annual
- Required monitoring of researchers PPE
- Required training of lab staff
- Required documentation of training
- Required response to inspections
- Required changes to lab maintenance
- Required changes to chemical storage, inventory and handling
- Required changes to lab protocols
- Required documentation of SOPs and lab protocols

Key Points:

- Communicating responsibilities and setting expectations
- Culture of safety established by acceptance of safety requirements and faculty engagement
- Implement requirements set by the 1990 OSHA Laboratory Standard

UCLA Faculty-Led Safety Committees

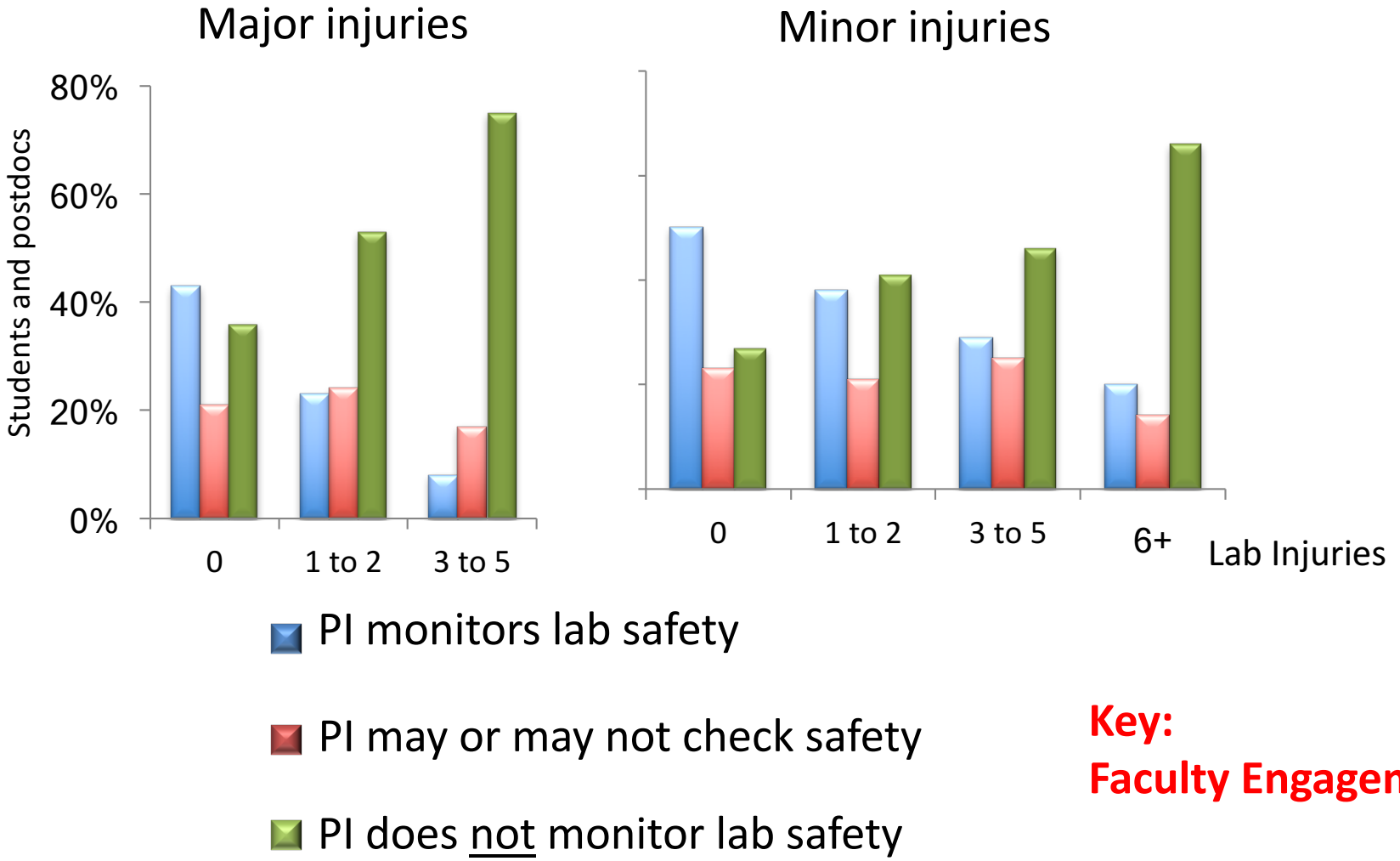


Key Points: Engage and Empower Faculty

All committees are led by research faculty

PI Responsibility

Impact of PI Safety Engagement on the Number of Lab Injuries



Key:
Faculty Engagement

I. Schröder, D.Y.Q. Huang, O. Ellis, J. H. Gibson, N. L. Wayne; *J Chem Health and Safety, 2015*

PI Responsibility

What is faculty engagement in lab safety?

- Faculty set expectations on students
- Faculty participate in EH&S inspections
- Faculty respond to inspection reports
- Faculty wear PPE
- Faculty discuss safety in group meetings
- Faculty discuss safety individually
- Faculty are involved in design of experiment safety

How to obtain faculty engagement in lab safety?

- Leadership sets expectations
- EH&S supports and engages them
- Leadership empowers them
- EH&S helps solve problems
- EH&S provides quality training
- Leadership supports innovation – software solutions

PI Responsibility

Problem: New Chair of Chemistry and Biochemistry had a high number of "findings" from EH&S inspections of his laboratory

Solutions:

- **Faculty Engagement**
- Rotating Laboratory Safety Officer position who does twice-daily inspections to better appreciate the value of safety regulations
- Frequent safety quizzes in meetings to give researchers an opportunity to assess their safety knowledge

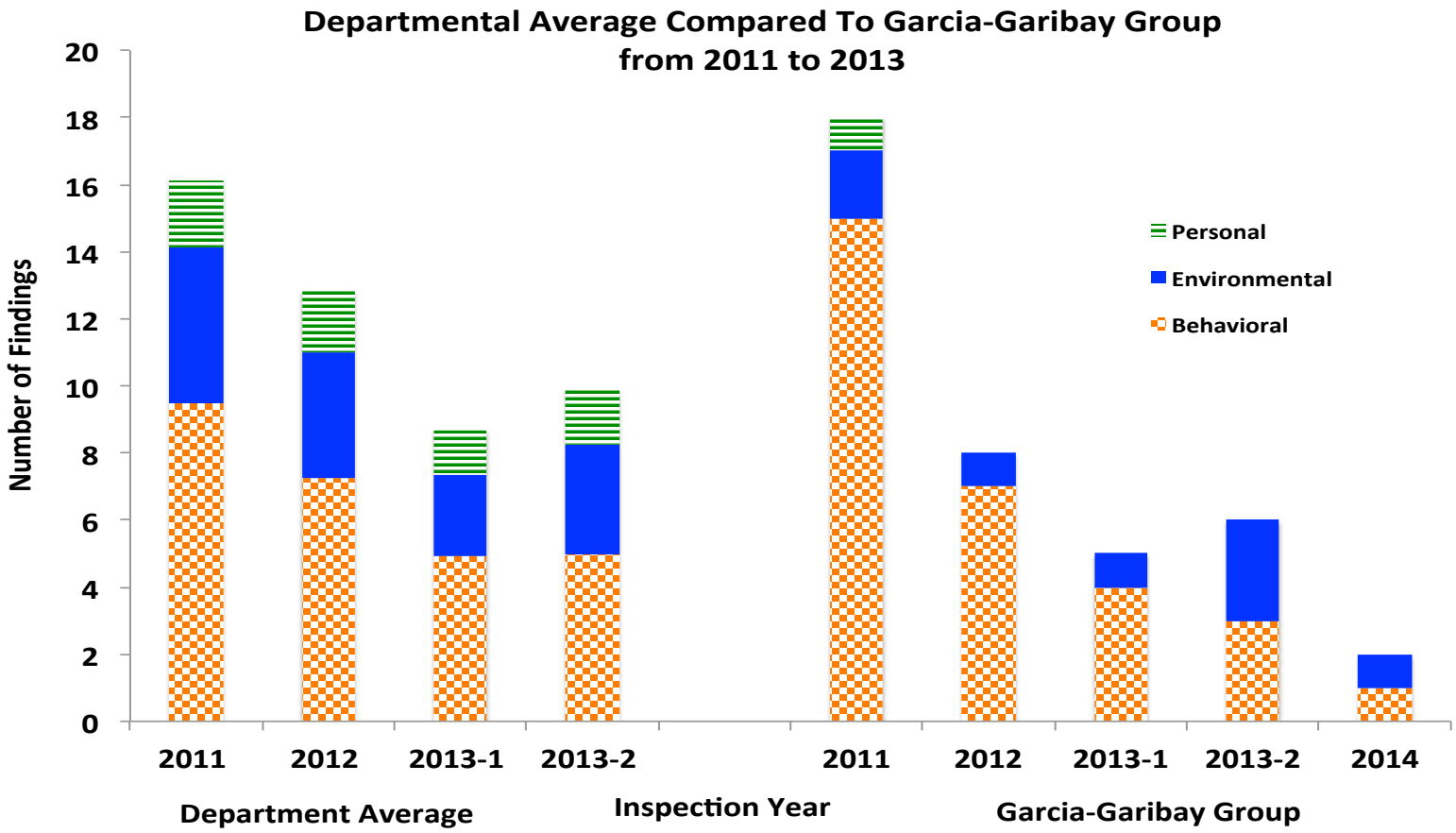
"An Approach To Enhance the Safety Culture of an Academic Chemistry Research Laboratory by Addressing Behavioral Factors"

I. O. Staehle, T. S. Chung, A. Stopin, G. S. Vadehra, S. I. Hsieh, J. H. Gibson, M. A. Garcia-Garibay; *Journal of Chemical Education* **2016**, *93*, 217-222.

PI Responsibility

Documented outcome in terms of changes to the lab Safety Culture as evidenced by EH&S inspection results in Garcia-Garibay Lab

Results:



PI Responsibility

Safety Guidelines for the Chemistry Professional

- ACS Division of Chemical Health and Safety

- The chemistry professional has an ethical and legal responsibility to work with chemicals safely.
- Chemistry professionals need to develop competency in evaluating hazards, conducting assessments, and mitigating the risks of those hazards.
- Chemistry professionals must actively participate in their organizational culture concerning the safe practice of chemistry.
- Safety skills need to be included as part of the formal education of chemistry professionals.

PI Responsibility

Safety Guidelines for Scientists

- ACS Division of Chemical Health and Safety

- Scientists have an ethical and legal responsibility to work with chemicals safely.
- Scientists need to develop competency in evaluating hazards, conducting assessments, and mitigating the risks of those hazards.
- Scientists must actively participate in their organizational culture concerning the safe practice of chemistry.
- Safety skills need to be included as part of the formal education of Scientists.

PI Responsibility

How to reinforce PI Responsibility?

- Campus leadership must set expectations
- Expectations must be communicated
- Campus EH&S must support and reinforce expectations
- EH&S must help solve problems
- PIs must be involved in changes
- Expectations must be taught

SAFETY TRAINING
CONSORTIUM

Safety Education

Lots of awesome material, but some challenges:

- Annual safety refresher training by EH&S is losing impact
- Need to bridge the gap between EH&S general lab safety training and lab-specific training
- Not all PIs provide quality lab-specific training
- Value of SOPs highly variable
- Better sharing of accident information is needed
- PI Responsibility training must be a home run

Safety Education

Lessons Learned

- Lessons Learned are too retrospective
- Lessons Learned can be too focused
- Lessons Learned standard theme: accident due to lack of SOP
- Lessons Learned could be better used for illustrating concepts
- Safety Case Studies can provide flexibility & rigor

Safety Education

Safety Case Studies

- Case studies present real laboratory situations with enough information to complete safety evaluations, but enough detail missing to allow creativity in making interesting and compelling analyses.

- For each case study:
  a) Identify all potential hazards
  b) Assess risk of each hazardous event
  c) Determine controls/steps/training/etc to eliminate or minimize hazards

Safety Education

Safety Case Studies

- **Undergraduate Research**: Your research advisor assigned you to mentor an undergraduate research student who will work with you on your current project. You are responsible for all aspects of her lab and safety training and deciding which experiments she will conduct in the first term of research.

- **Gel Electrophoresis**: You are inventing a new gel electrophoresis method for the separation and analysis of gold nanoparticles tagged with macromolecules (DNA, RNA and proteins) based on size and net charge. You plan to use an old home-built unit in order to make your own modifications to the gel composition, gel depth, electric field strength, and electrode design.

Hazard Identification, Risk Assessment and Hazard Mitigation

MOST important component of lab safety

- Focuses on Safety rather than Compliance
- Least understood component of lab safety
- Least used component of lab safety
- ACS tool is one solution
- STC course aims to teach this topic

Hazard Identification, Risk Assessment and Hazard Mitigation

Some HI/RA/HM tools try to cover everything

- If it is too cumbersome, it will not be used
- The detail that makes it rigorous limits its use
- A family of tools might be more effective
- A smart form with internal logic could be another solution to streamline the process
- Use databases to call up information

FACULTY TIME

Or lack thereof

- Yes, it is a lousy excuse not to follow through on lab safety, but…
- Faculty want more support from campus EH&S
- University systems need more collaboration between campuses
- EH&S and other safety communities, like DCHAS, have and will continue to play a major role

CONCLUSIONS

- Lab safety is a lot like exercise, thinking about it once a month is not good enough
  - *A sustained and comprehensive approach is necessary*

- PI Responsibility
  - *PI engagement is the most effective action to impact safety*
  - *PI engagement reduces injuries and promotes a culture of safety*

- Safety Education
  - *Critical to improve safety practices, but many gaps exist*

- Hazard Identification, Risk, Assessment and Hazard Mitigation
  - *Possibly the most important action to improve lab safety*
  - *Required to move from safety compliance to lab safety*

Think Safety

What could go wrong?
How can I prevent it?
How can I prepare for the unexpected?

Acknowledgements

- Dr. Imke Schroeder (UCLA, UCCLS)
- Dr. Nancy Wayne (UCLA, UCCLS)
- Dr. Michael Blayney (Northwestern Univ, STC)

- Advisory Board, UC Center for Laboratory Safety
- Advisory Board, Safety Training Consortium
- UCLA Chemistry & Biochemistry
- UCLA EH&S
- UCOP Enterprise Risk Management
- UC Risk & Safety Solutions

- Milliken, Workrite, Mission Linen - ShieldTEC Lab Coats

UC | Center for Laboratory Safety

SAFETY TRAINING CONSORTIUM

UCLA