



## Paintballs and Eye Injuries, Remember $E=mv^2$ ?

Timothy W. Olsen MD

Paintball guns have become a very popular form of entertainment. Many active young people use this toy/weapon in so-called “war-games”. Team members dress in different colors . . . the red team and the blue team . . . with the clear objective of shooting the opponents, sometimes capturing their flag and winning the competition. The guns are not regulated, and can be purchased without any background check, even off the Internet. The paintballs are made of a gelatin filled with paint. So, when you’re shot, they sting a bit, splatter, and give the illusion of blood. Very cool indeed!



As an ophthalmologist, I have a very different view of these guns. From my perspective, I see young, healthy, active people who present to the Emergency Department with severely injured eyes. How does this occur? Some facts are important to understand in order to hopefully understand and avoid these injuries.

The paintballs themselves travel at a high velocity (fast), and are relatively heavy (mass). There’s an important equation that you may (or may not) remember from physics class:

$$\begin{aligned} \text{The total Kinetic energy} &= \text{mass} \times \text{velocity}^2 \\ E &= mv^2 \end{aligned}$$

So, if you have an object that is heavy, flying at a high rate of speed, it generates lots of energy. If that energy hits your leg or abdomen, and the object is soft (gelatin), it splatters and stings. However, when that same high kinetic energy hits your eyeball (the size of the eye is roughly equal to the size of the paintball), all of that energy is transferred from the paintball to your eye. OUCH! It can do tremendous damage.

Paintball participants say, “but we wear eye protection!”. Great! However, when hit by a paintball in the protective eyewear . . . “I can’t see.” Next reaction . . . remove the eyewear . . . Bang, second shot hits the eye. It happens frequently. Many times, players want to try out their guns before they start formal games and accidentally shoot their friend before protective eyewear is placed.

Another bad situation occurs with the “drive by shooting.” Innocent and fun when you shoot someone with a paintball, no damage done right? Not really. If the paintball hits the passerby in the eye instead of the shoulder, severe injury and even blindness in the eye may be the end result.

Bottom line is that paintball guns are a source of severe eye injury and may result in blindness of the eye. In a young, healthy person, such an injury may change that person’s career. If it’s his/her only eye, they could become blind.

As a surgeon, trying to fix these eyes is very difficult because the injury is blunt and contusive (like dropping a computer off from the 3<sup>rd</sup> floor office window). The delicate structures of the eye are usually damaged beyond repair. So, the solution is through education. Many paintball facilities necessitate full helmets and proper eye protection (plus ears and other delicate body parts). Use of paintball guns outside of a carefully monitored facility should be avoided. Paintballs and eyeballs don’t mix! Thanks for listening. Please spread this word.

## Anatomy of a Laboratory Accident

This past spring, a graduate student was conducting a routine laboratory procedure on an open lab bench when an equipment failure resulted in an exposure and subsequent visit to the Emory Emergency Department (ED). The student was working with a combination of tri-n-butyl phosphine, cadmium oxide and selenium. This combination produced precipitates which required the solution to be filtered using a syringe and Millipore filter.

## Training

Most of EHSO’s Trainings are available online in Blackboard.

[www.ehso.emory.edu](http://www.ehso.emory.edu) for registration information.

### Radiation Safety Training

2nd Tuesdays at 9:00 am

### Shipping Training

August 17th (12:00p.m-4:00pm)

### Laboratory Safety Training

3rd Thursdays at 10:00 am

### Eye Wash Testing

Someone in your lab should test the eyewash station once a month.

Bio-safety Cabinets/Chemical Fume Hoods Certification required annually.

### **Chemical/Radioactive Waste**

#### **Pick-up Schedule:**

#### Monday Pick-up

RRC

Whitehead

1462 Clifton Road

School of Public Health

#### Tuesday Pick-up

Math & Science

#### Tuesday & Friday Pick-up

Atwood and Emerson

#### Wednesday Pick-up

Emory Children’s Center

Clinic Building A & B

Winship Cancer Institute

Yerkes Main Station

#### Thursday Pick-up

Woodruff Memorial Research

Building

EUH (Clifton)

#### Friday Pick-up

All others on Atlanta campus

All **chemical** waste pick up should be requested by emailing

[chemwaste@emory.edu](mailto:chemwaste@emory.edu)

All **radioactive** waste pick up should be requested via EHS Assist pick-up.

**Chemical** waste disposal inventory form and/or **radioactive** waste inventory form should accompany all waste containers at the time of pick-up.

When the student pushed the plunger on the syringe the pressurization caused the filter to fail at the junction and some of this solution splashed back into the student's mouth. The student immediately rinsed several times with water and then contacted Emory Police. Emory Emergency Medical Service (EMS) and the Environmental Health and Safety Office (EHSO) were dispatched and responded to the incident. The student produced a Material Safety Data Sheet (MSDS) for review and was monitored by EMS and interviewed at the scene by EHSO. While the chemical components involved were toxic it was determined that because the concentration was very low and the student immediately rinsed with water that risk was minimal. The student was advised to present to Emory ED for further evaluation. This student fortunately suffered no ill effects from the chemical components potentially ingested. However, this exposure could have been prevented even if it was the result of equipment failure.

**Although the outcome of this incident was favorable, what lessons can be learned?**

- Use engineering controls provided! Emory laboratories are designed with proper engineering controls, such as chemical fume hoods, to reduce risk. As quoted by the student: *"I realize no matter how easy it is to handle chemicals in the lab, all the safety rules should be followed. Had I performed the task in the chemical fume hood with sash closed instead of on the bench, this accident would not have happened."*
- Always wear the appropriate Personal Protective Equipment (PPE) for the task being performed. Always wear a lab coat, gloves, and eye protection when working in a lab. If a process has the potential to produce a splash exposure, wear protective goggles or a face shield. In this situation a face shield would have greatly reduced the potential for exposure.
- Remember that first aid is the first priority after an exposure to a potential hazard. Know where all emergency eyewash stations, showers, and sinks are located so that you can wash the affected area immediately.
- Always read MSDS's for the chemical substances you are using. In the event of an exposure it will be very important to be familiar with an MSDS.
- Post telephone numbers to call for help. (Just in Time flipchart)

**Building Liaisons**

Each building has been assigned an EHS Specialist to assist with any questions/concerns you may have.

- Dionna Thomas 404-727-4673  
Woodruff, Woodruff Extension, & Winship (Clinics B & C)
- Meagan Parrott 404-712-9480  
Dental, Medical Office Tower, Emory Midtown, School of Public Health (CNR/GCR), & Rollins
- Steve Arehart 404-727-4171  
Clinic B-Eye Center, Pediatrics, North Decatur, Carlos Museum, Yerkes, Hope Clinic, Wesley Woods, Briarcliff Campus, & Anthropology
- Rodrick Esaw 404-727-1348  
Whitehead, Math & Science, Emerson, Oxford College, & Atwood

**Notice**

- ◇ This newsletter is a tool to help fulfill a legal requirement for ongoing safety training.
- ◇ Supervisors are responsible for ensuring that individuals in their area have read and understood the information that applies to their area.
- ◇ The signed newsletter should be placed into the PIs EHSO Binder.

Signature indicates: I have read and I understand the information in this issue of Lab Rat Newsletter. Use an additional sheet of paper for more signatures, if needed and attach to this document.

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**PPE**

Personal Protective Equipment

Choice to be based on potential exposures involved:

Eye: Glasses, goggles & face shields

Gloves: Appropriate for the type of procedure

Clothing: Gowns, lab coats, aprons, coveralls

Respirators: Appropriate for the type of procedure



**Fire Extinguishers**

Check fire extinguishers in your lab:

A. Is it present and mounted in its proper location?

B. Is it readily accessible?

If it appears to need servicing contact the Maintenance HELP line at 7-7463



Contact Employee Health Services / Emory Healthcare Corporate regarding immunization information at (404-728-6437)



**Lab Rat NEWS JULY 2011**

**We would like to hear from you**

- What do you like most about the Lab Rat?
- What do you like least about the Lab Rat?
- Which article was most helpful to you?
- What topics would you like to be featured in upcoming issues?
- Do you have an article you would like to contribute?

Feel free to send your answers to [bio-safe@emory.edu](mailto:bio-safe@emory.edu). We look forward to reading your ideas and comments!