

# RESEARCH TRAINEES

## WHAT YOU NEED TO KNOW ABOUT RESEARCH MISCONDUCT

### Misconduct Is Not Limited to Published Research

Research misconduct is fabrication, falsification, or plagiarism<sup>1</sup> and can occur in publications, presentations, posters, and grant applications – whether they are funded or unfunded.

### Research Misconduct Affects Everyone

Tainted research can have negative implications on individuals in the lab, the larger research community, and in the public's trust in science.

### There Is a Professional You Can Contact

Most institutions refer to this person as the Research Integrity Officer (RIO)<sup>2</sup>. You can contact your RIO about questionable practices.

### Anyone Can Report Misconduct

Scientists are obligated to point out errors regardless of their position in the lab. The research community depends on you to report misconduct.

### Institutions Have Policies to Protect All Involved

Every institution has a requirement to take all reasonable and practical steps to protect the reputation of those who report research misconduct and anyone falsely accused.

### You Can Report Research Misconduct Anonymously

Anyone can contact ORI anonymously by phone or email to address concerns.

 240-453-8800  
 AskORI@hhs.gov

### Of ORI's research misconduct cases<sup>3</sup>:

**12%** were reported by research trainees

**40%** were committed by research trainees



- <sup>1</sup> For the full definition of research misconduct, see 42 C.F.R. § 93.103.
- <sup>2</sup> RIOs may have other titles, such as Chief Compliance Officer, Director of Compliance, Vice President/Dean of Research, or Director of Integrity.
- <sup>3</sup> Statistics based on closed ORI case findings from 2011–2015. Trainees are students and postdoctoral fellows.

Learn more about responsible research at: [ori.hhs.gov](http://ori.hhs.gov)



  
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# WHAT DRIVES PEOPLE TO COMMIT RESEARCH MISCONDUCT?

These quotes come from people who admitted to research misconduct in closed Office of Research Integrity cases. Research misconduct is never justified, but it is important to recognize potential drivers of misconduct to better understand how it might be prevented.

## POOR SUPERVISION

“ I WAS SCARED TO GO TO [MY PI]. HE USED TO SCREAM & YELL AT ME WHEN THINGS DID NOT WORK AS PLANNED. ”



## INADEQUATE TRAINING

“ AFTER TWO YEARS OF A POSTDOCTORAL FELLOWSHIP... I STILL DON'T KNOW HOW TO PROPERLY PUBLISH WESTERN BLOT DATA. ”

## COMPETITIVE PRESSURES

“ I FELT IT WAS NECESSARY TO GET A PAPER IN A HIGH-PROFILE JOURNAL IN ORDER TO GET A FACULTY POSITION. ”



## PERSONAL CIRCUMSTANCES

“ [I] HAD BEEN APPLYING FOR A GREEN CARD AND FELT PRESSURED TO MAKE A GOOD PAPER AND GET GOOD PUBLICATIONS. ”



## INDIVIDUAL PSYCHOLOGY

“ HALF OF ME WANTED TO MAKE [MY PI] PROUD. THE OTHER HALF WAS TERRIFIED OF FAILING... SO I FABRICATED A PIECE OF DATA. ”



Seek support from a mentor if stressors are impacting your work.



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# IT'S A SLIPPERY SLOPE TO RESEARCH MISCONDUCT

It doesn't matter if you're an undergraduate researcher, a graduate student, a post-doc, or a principal investigator who is performing federally funded research, writing a research paper, or leading a research program; research integrity matters at every level.

**Small lapses in judgment could lead to a slippery slope ending in research misconduct.**

Be vigilant against these common lapses:

## 1. TAKING SHORTCUTS

Lack of care in experimentation that might impact reproducibility

## 2. CHEATING

Such as puffery, which is inflating your resume, can establish dangerous behavior patterns

## 3. "BEAUTIFICATION" OF IMAGES

Removing an unwanted feature, even if unrelated to the result, could be scientifically significant

## 4. LACK OF APPROPRIATE CONTROLS

Failure to perform a control with the experimental sample could affect result interpretation

## 5. COMPOSITE IMAGES

Assemblies of images that are not clearly labeled, such as a montage of cell images from the same experiment but not labeled as such.

## 6. OUTLIERS

Omitting outlier data without appropriate pre-experiment justification which alters the overall conclusion of the analysis

## 7. IMAGE MANIPULATION

Splicing, cutting, or cropping images; without properly documenting changes, that alters the results or falsely claims a result which was not obtained.

Questionable or Detrimental Research Practices may be considered research misconduct in some cases, but the facts of each case differ and must be individually evaluated.



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# CAN YOU SPOT RESEARCH MISCONDUCT?

## INVESTIGATING IMAGE MANIPULATION

### OBJECTIVE

See if you can detect the research misconduct in this sample results section.

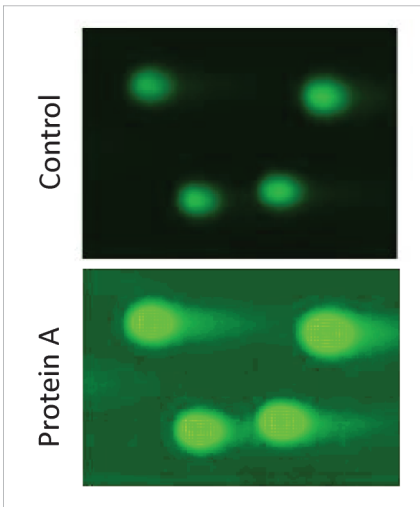
### METHODS

Thoroughly review the images below to determine what was falsified or fabricated.

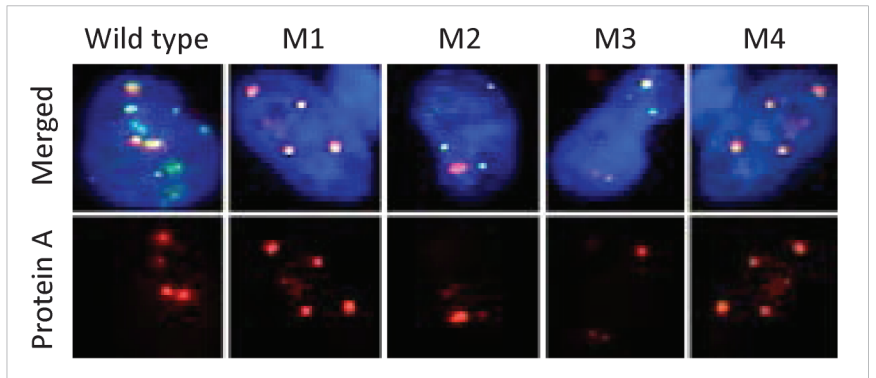
### RESULTS

Check your findings with the explanations in the discussion section.

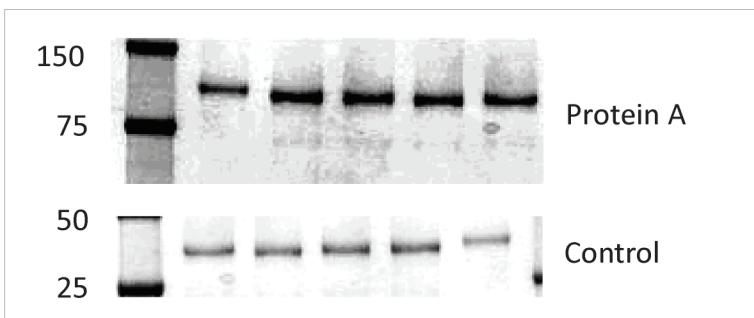
**FIGURE 1. COMET ASSAY**



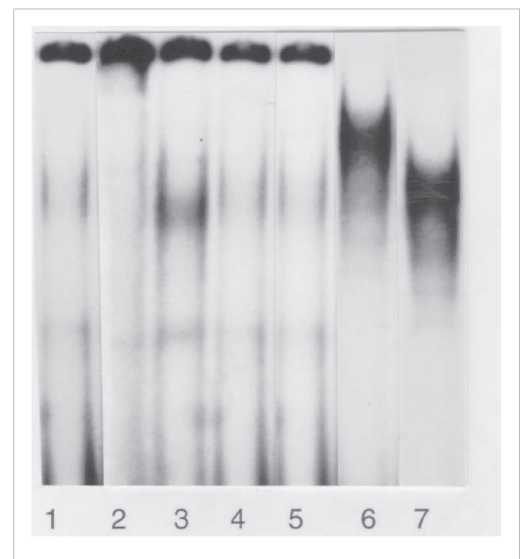
**FIGURE 2. IMMUNOFLUORESCENCE COLOCALIZATION ASSAY**



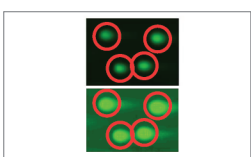
**FIGURE 3. WESTERN BLOT**



**FIGURE 4. GEL SHIFT ASSAY**

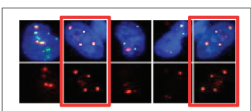


### DISCUSSION



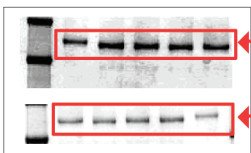
**FIGURE 1. COMET ASSAY**

The control image was cropped and relabeled as the image for Protein A. It was also intentionally lightened to make the "tails" appear longer.



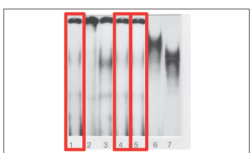
**FIGURE 2. IMMUNOFLUORESCENCE COLOCALIZATION ASSAY**

M1 and M4 are the same image but flipped horizontally.



**FIGURE 3. WESTERN BLOT**

The top panel and bottom panel of Figure 3 are from the same source image. The Protein A blot image has been flipped horizontally and represented as the control blot image.



**FIGURE 4. GEL SHIFT ASSAY**

Lanes 1, 4, and 5 are from the same image source and were relabeled and reused to represent different experimental conditions.

### CONCLUSION

Readers play an important role in detecting image manipulations. If you think you see research misconduct, make your concerns known to your institutional Research Integrity Officer.

**DID YOU SPOT IT?**

Learn more about image processing at: <http://ori.hhs.gov/ImageProcessing>



# POSSIBLE RED FLAGS OF RESEARCH MISCONDUCT



## TIME

- Usable data are only generated when there is a pressing deadline
- Experiments are completed faster than usual

## RESULTS

- Data are too good to be true
- Findings can't be replicated by others in the lab



## LACK OF TRANSPARENCY

- Raw data can't be produced when requested
- Research materials and protocols are kept hidden
- Work is mostly done when no one else is around

### If you suspect research misconduct

contact your institution's Research Integrity Officer or ORI at [AskORI@hhs.gov](mailto:AskORI@hhs.gov)

