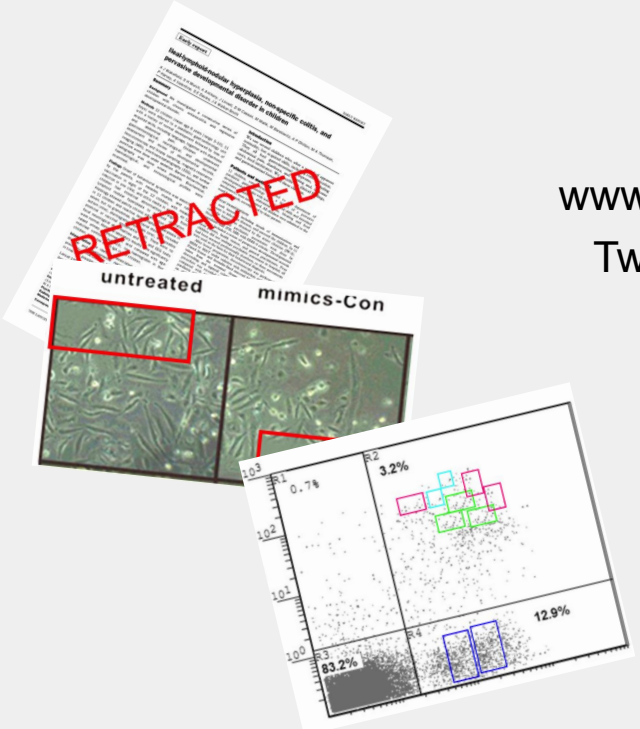
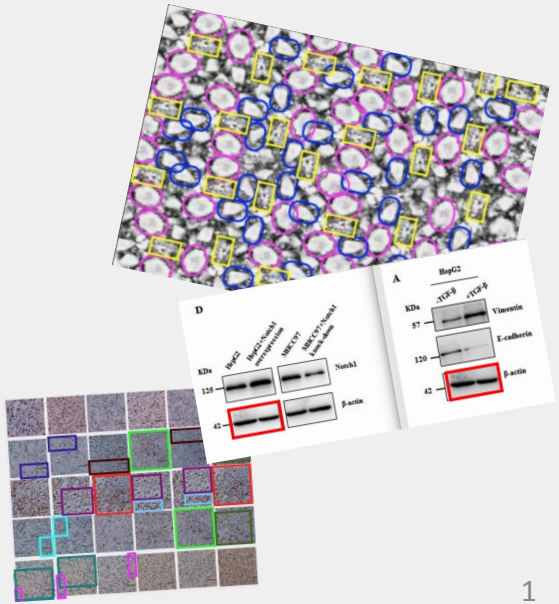
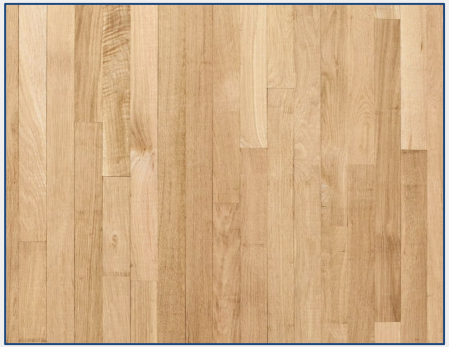
Pre- and Post-Publication Image Screening



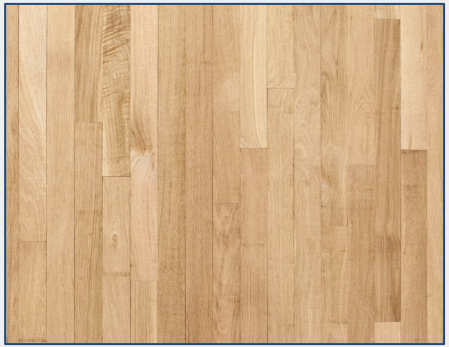
Elisabeth Bik
www.ScienceIntegrityDigest.com
Twitter/X: @MicrobiomDigest

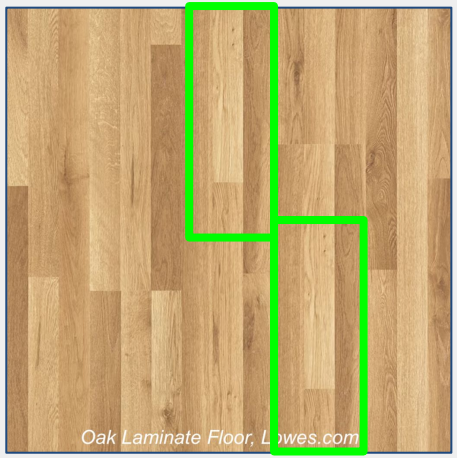


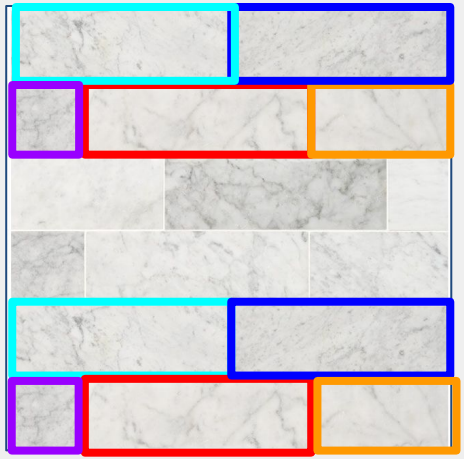
Nature is unique, fakes often repetitive



Nature is unique, fakes often repetitive

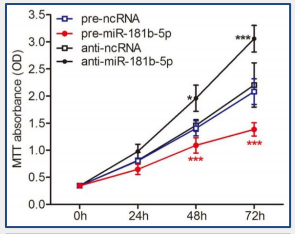


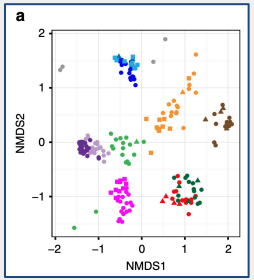


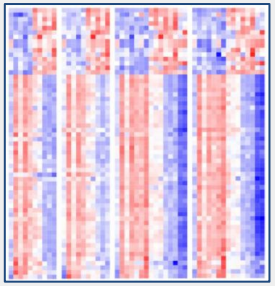


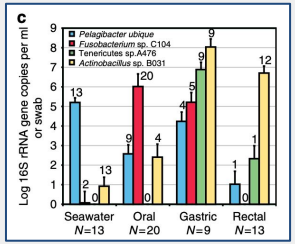
Figures found in biomedical papers

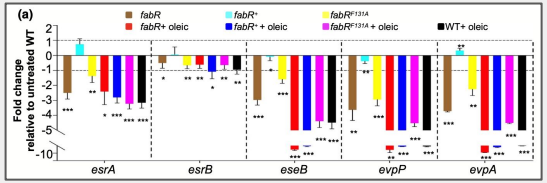
Line graphs

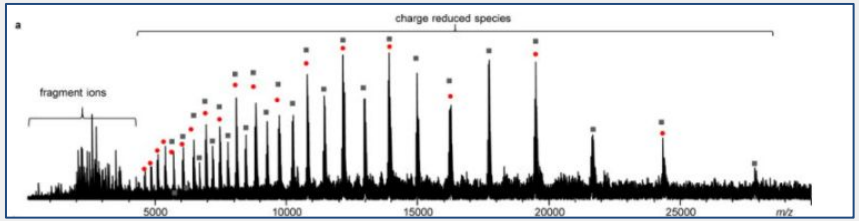




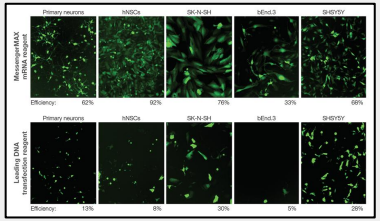


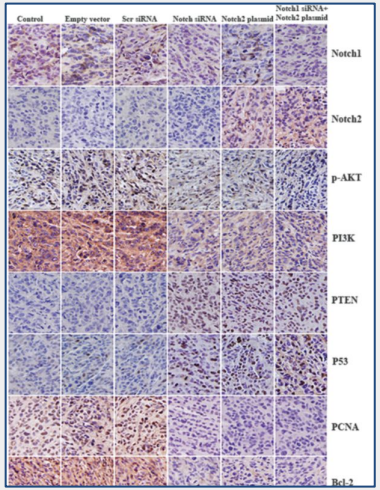


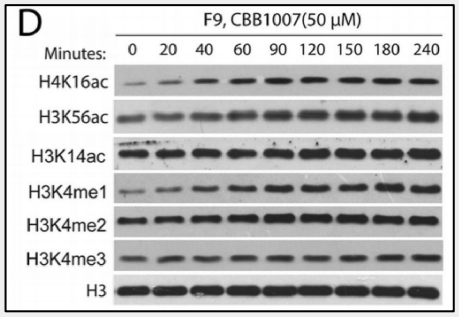


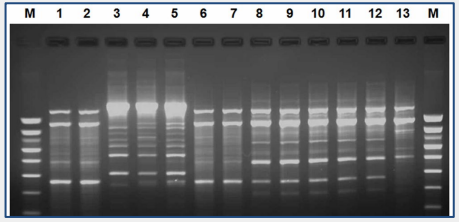


Photos



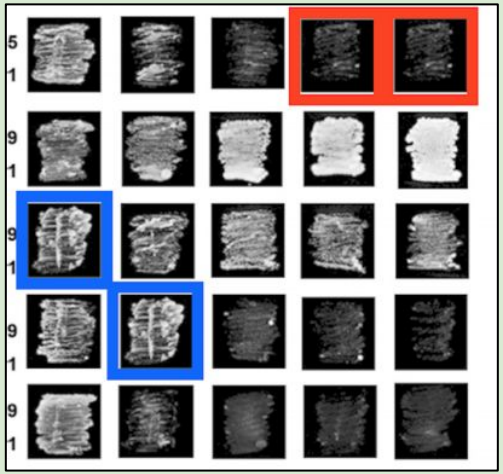






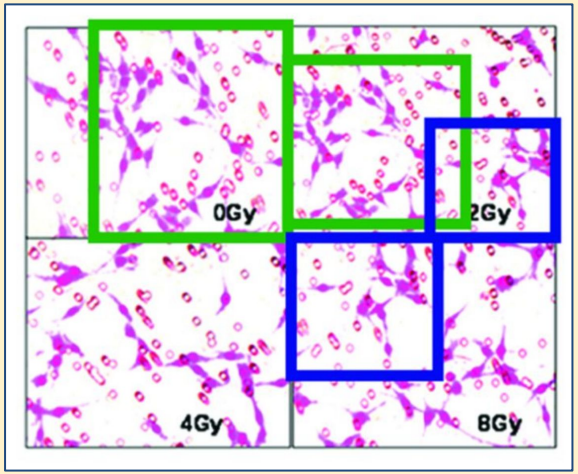
Inappropriate image duplication

I: Simple



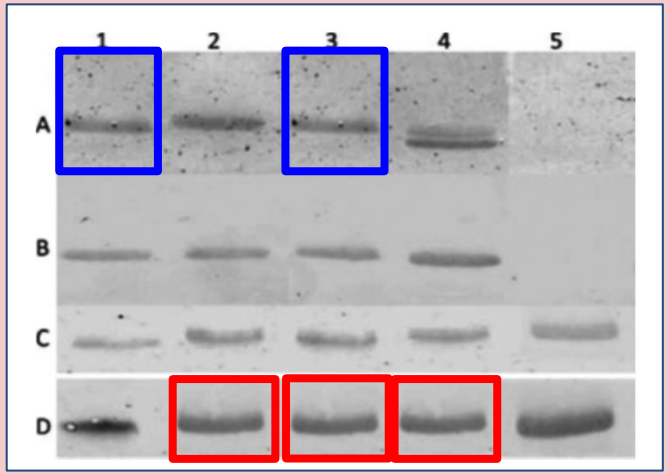
DOI: 10.1128/MCB.00773-15

II: Repositioned



DOI: 10.1371/journal.pone.0098448

III: Alteration



DOI: 10.1111/j.1469-0691.2011.03607.x

Honest error ⟷ Deliberately

The temptation of image manipulation

Source: @Kanahooo on Weibo
Koreaboo.com

Source: Redbook Magazine, Anna Holmes, Jezebel / Washington Post

The temptation of image manipulation

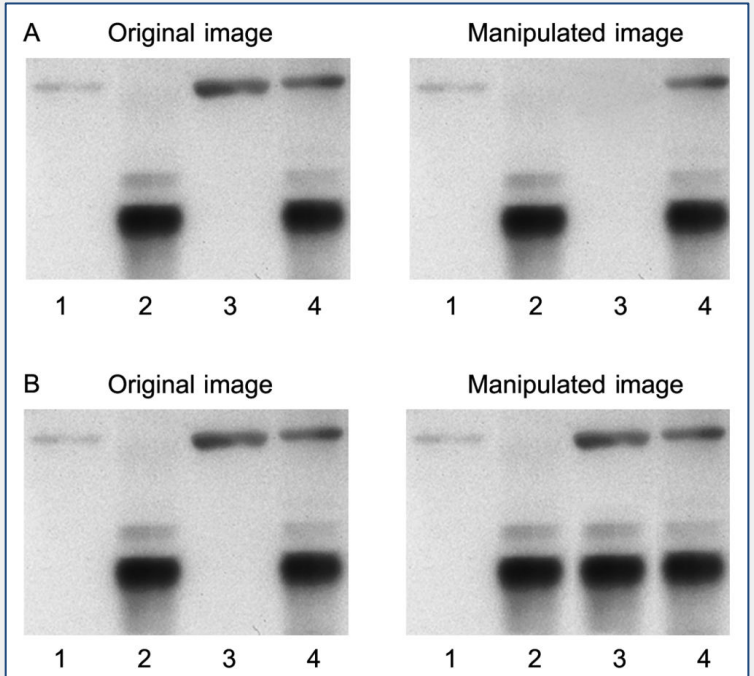


Figure 1. **Gross manipulation of blots.** (A) Example of a band deleted from the original data (lane 3). (B) Example of a band added to the original data (lane 3).

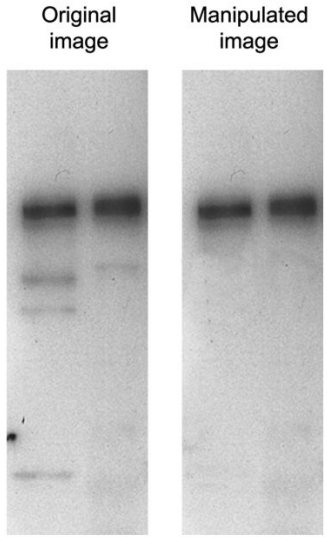


Figure 4. **Manipulation of blots: cleaning up background.** The Photoshop "Rubber Stamp" tool has been used in the manipulated image to clean up the background in the original data. Close inspection of the image reveals a repeating pattern in the left lane of the manipulated image, indicating that such a tool has been used.

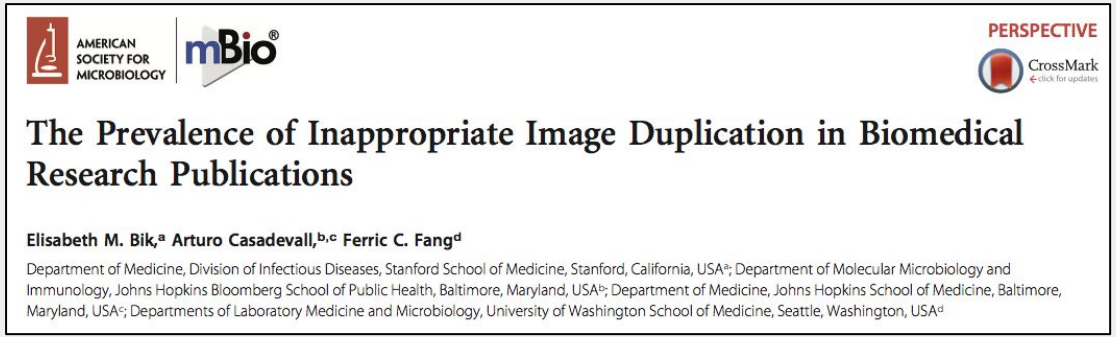
For every adjustment that you make to a digital image, it is important to ask yourself, "Is the image that results from this adjustment still an accurate representation of the original data?" If the answer to this question is "no," your actions may be construed as misconduct.

Other data-management issues

It is crucially important to keep your original digital or analog data exactly as they were acquired and to record your instrument settings. This primary rule of good scientific practice will allow you or others to return to your original data to see whether any information was lost by the adjustments made to the images. In fact, some journal reviewers or editors request access to such primary data to ensure accuracy.

Rossner and Yamada, J Cell Biology (2004), DOI: 10.1083/jcb.200406019

Inappropriate image duplication study (2016)



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PERSPECTIVE

CrossMark click for updates

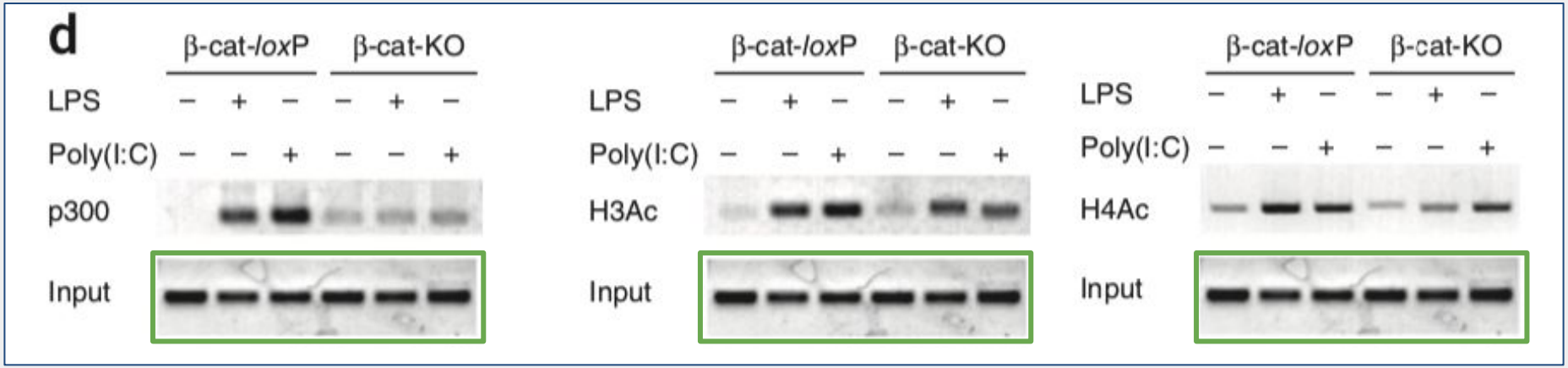
The Prevalence of Inappropriate Image Duplication in Biomedical Research Publications

Elisabeth M. Bik,[a] Arturo Casadevall,[b,c] Ferric C. Fang[d]

Department of Medicine, Division of Infectious Diseases, Stanford School of Medicine, Stanford, California, USA[a]; Department of Molecular Microbiology and Immunology, Johns Hopkins Bloomberg School of Public Health, Baltimore, Maryland, USA[b]; Department of Medicine, Johns Hopkins School of Medicine, Baltimore, Maryland, USA[c]; Departments of Laboratory Medicine and Microbiology, University of Washington School of Medicine, Seattle, Washington, USA[d]

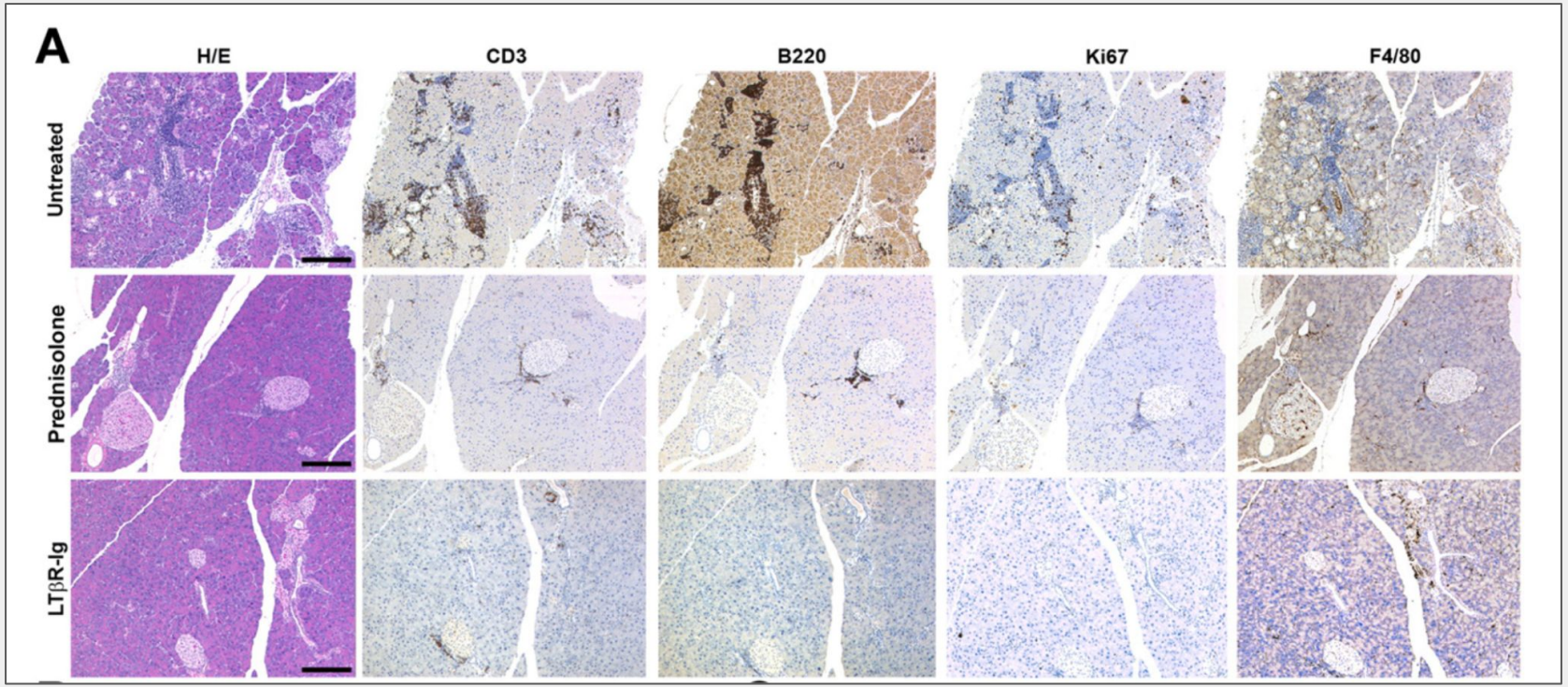
- 20,621 papers from 1995-2014, scanned by eye
- 40 journals from 14 publishers
- Found 782 papers with duplicated figures (4%)
- Not all are misconduct! About half intentional: 2%
- Alteration in other data types much harder to detect
- DOI: 10.1128/mbio.00809-16

Appropriate image duplications - no problem



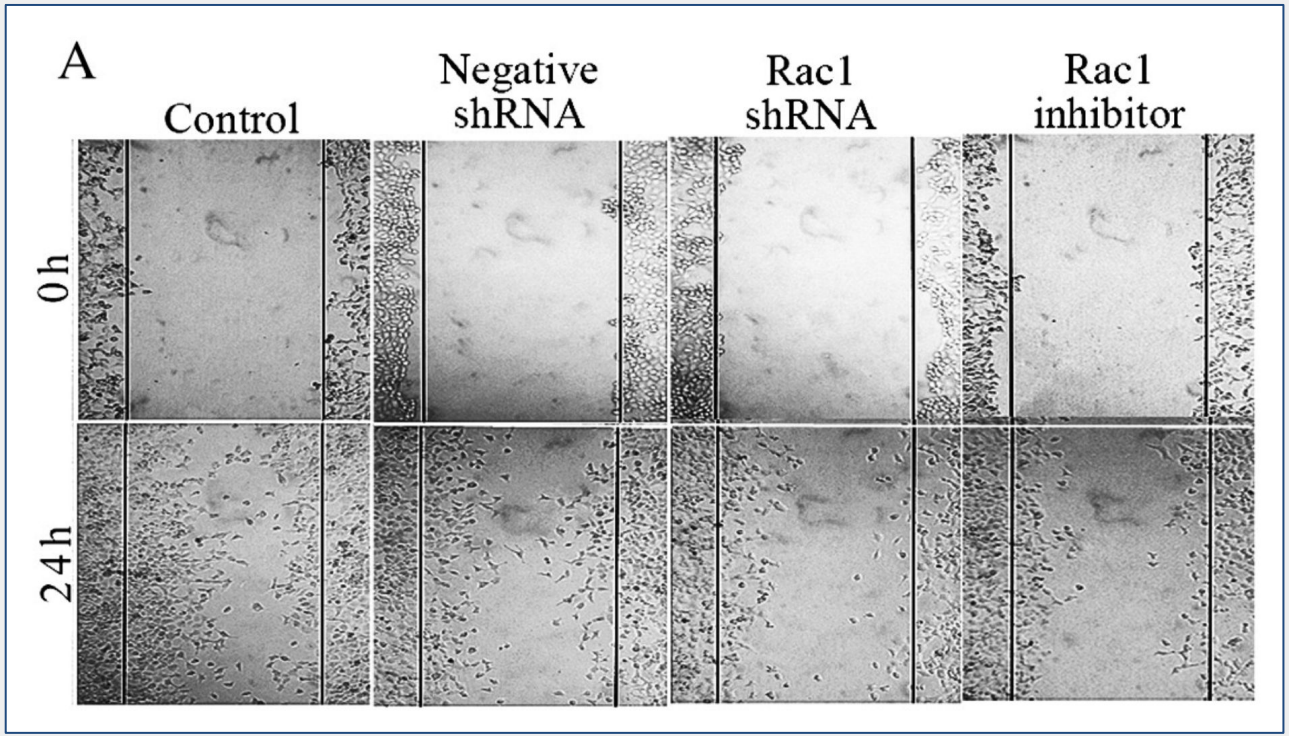
Second Military Medical University, Shanghai, China
Nature Immunology (2010), DOI: 10.1038/ni.1876

Adjacent sections are similar - no problem



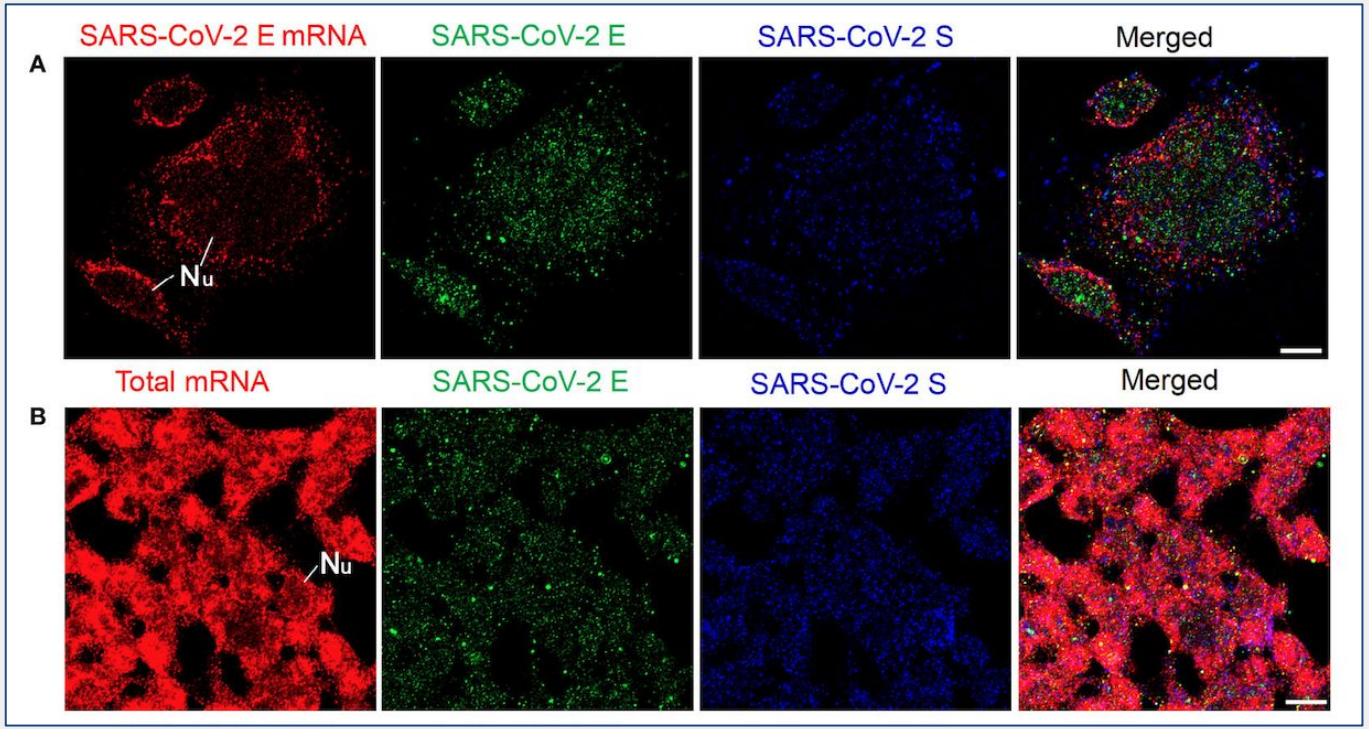
DOI: 10.1053/j.gastro.2012.07.112

Stain on the microscope - no problem



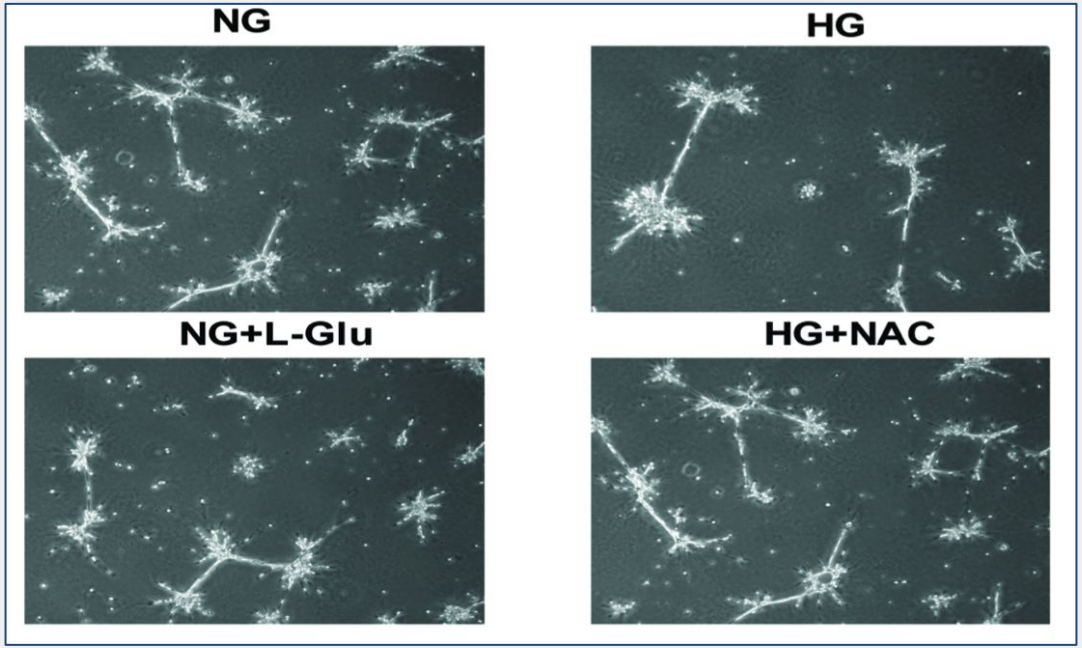
DOI: 10.1016/j.jnutbio.2013.10.004

Appropriate image duplications: no problem



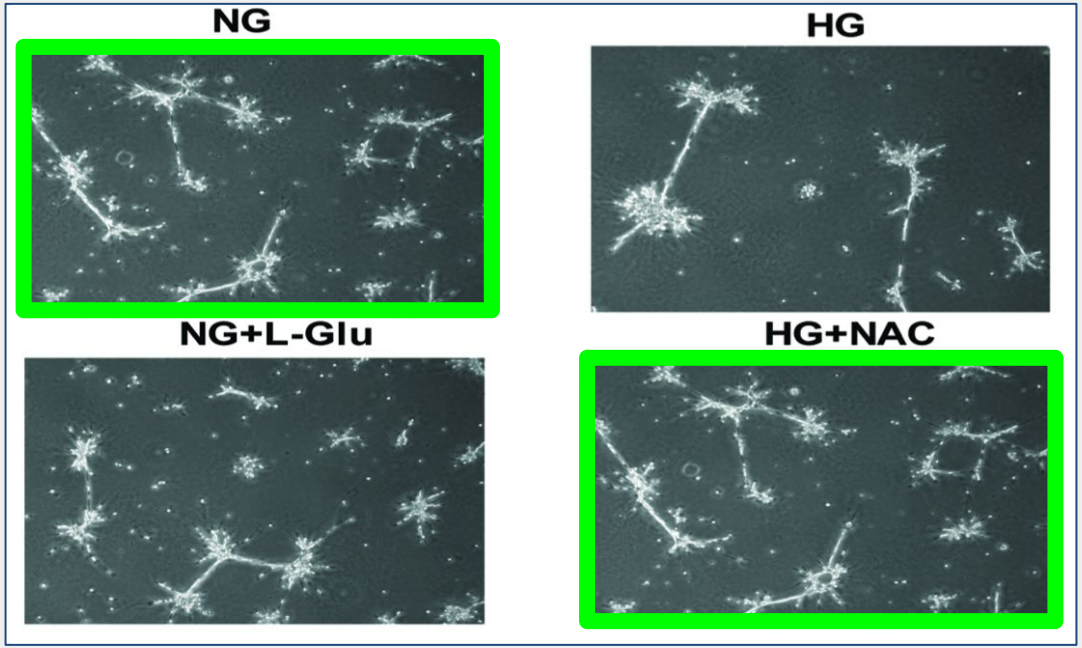
Fluorescence in situ Hybridization, Confocal Microscopy
Front. Cell. Infect. Microbiol. (2022); DOI: 10.3389/fcimb.2022.960938

Type I: Simple Duplication - honest error



Effect of diabetes on retinal astrocytes
University of Wisconsin School of Medicine and Public Health, USA
PLOS ONE (2014), DOI: 10.1371/journal.pone.0103148
Reported to journal: October 2015. No action yet.

Type I: Simple Duplication - honest error



Effect of diabetes on retinal astrocytes
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PLOS ONE (2014), DOI: 10.1371/journal.pone.0103148
Reported to journal: October 2015. No action yet.

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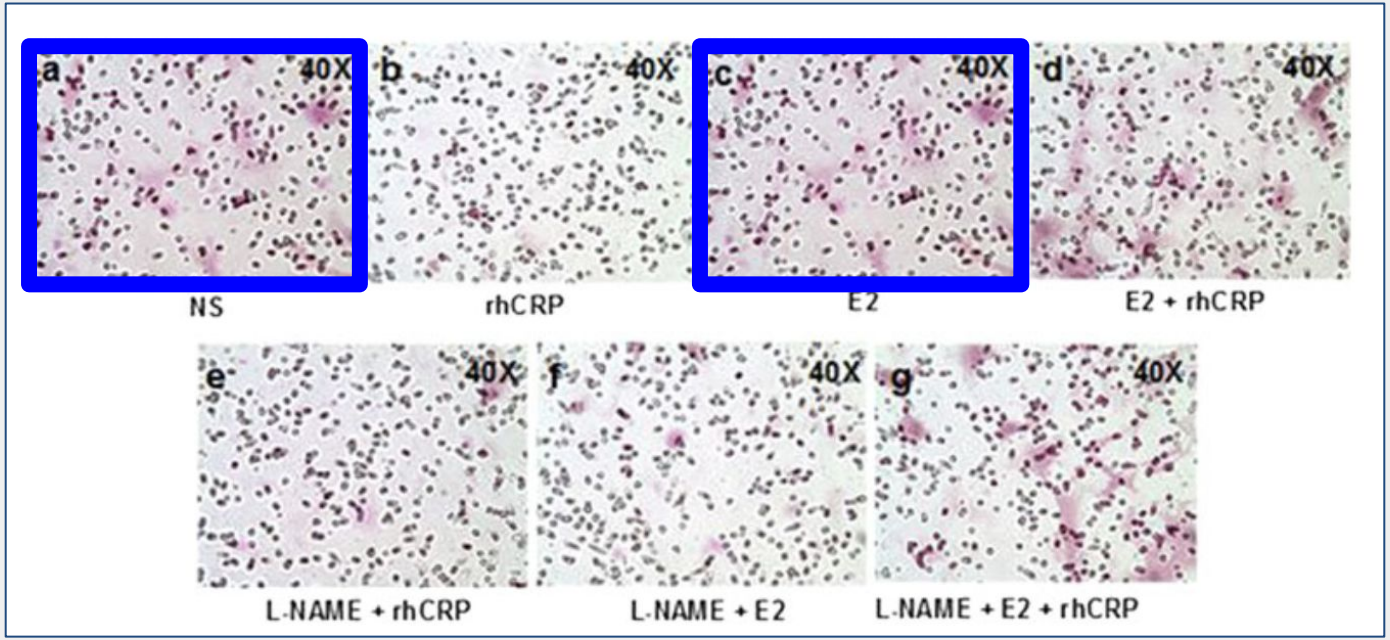
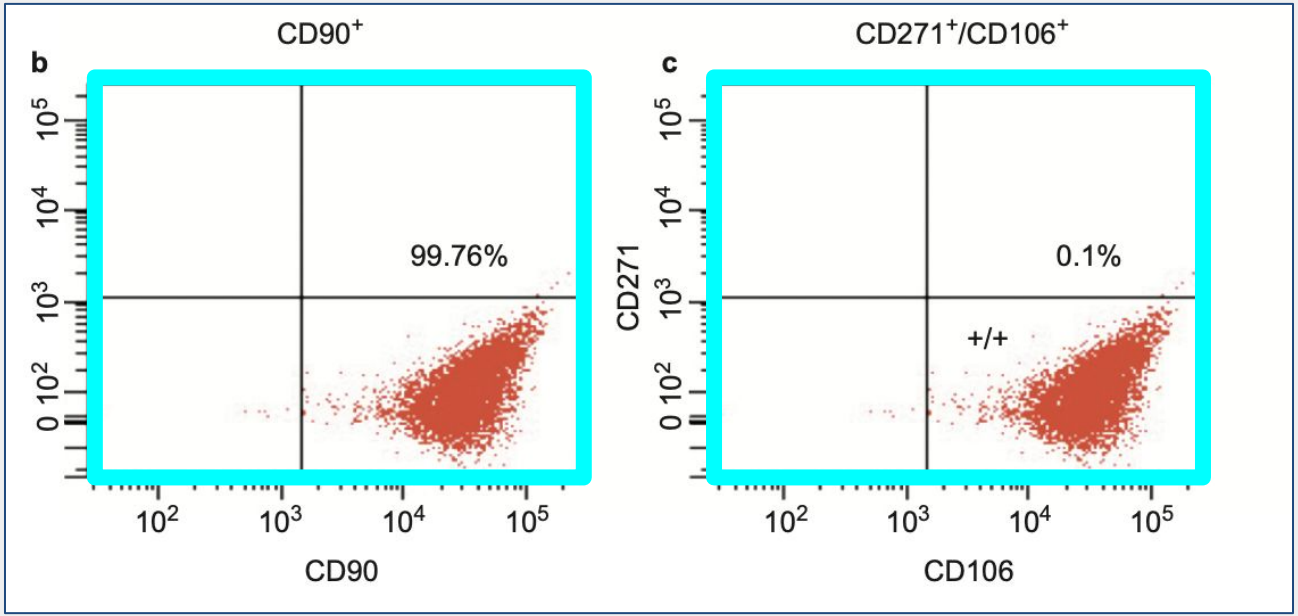


Estradiol inhibits vascular endothelial cells pro-inflammatory activation
Montreal Heart Institute, Canada
Molecular and Cellular Biochemistry (2013), DOI: 10.1007/s11010-012-1482-9
Reported to journal: October 2015. No action yet.

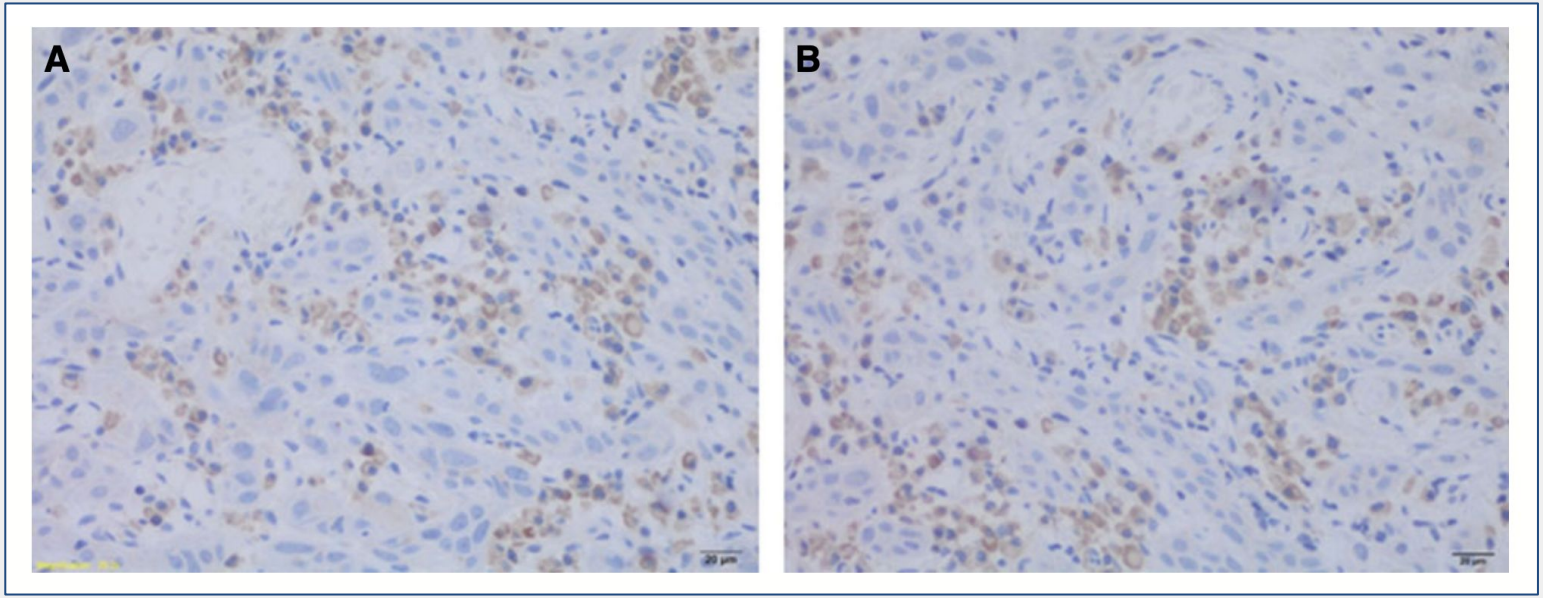
Type I: Simple Duplication - honest error



Stem cells surface markers from human dental pulp
School of Dentistry, University of California at Los Angeles, USA
International Journal of Oral Science (2015), DOI: 10.1038/ijos.2015.29
Corrected: 2019

Type II: Duplication with repositioning

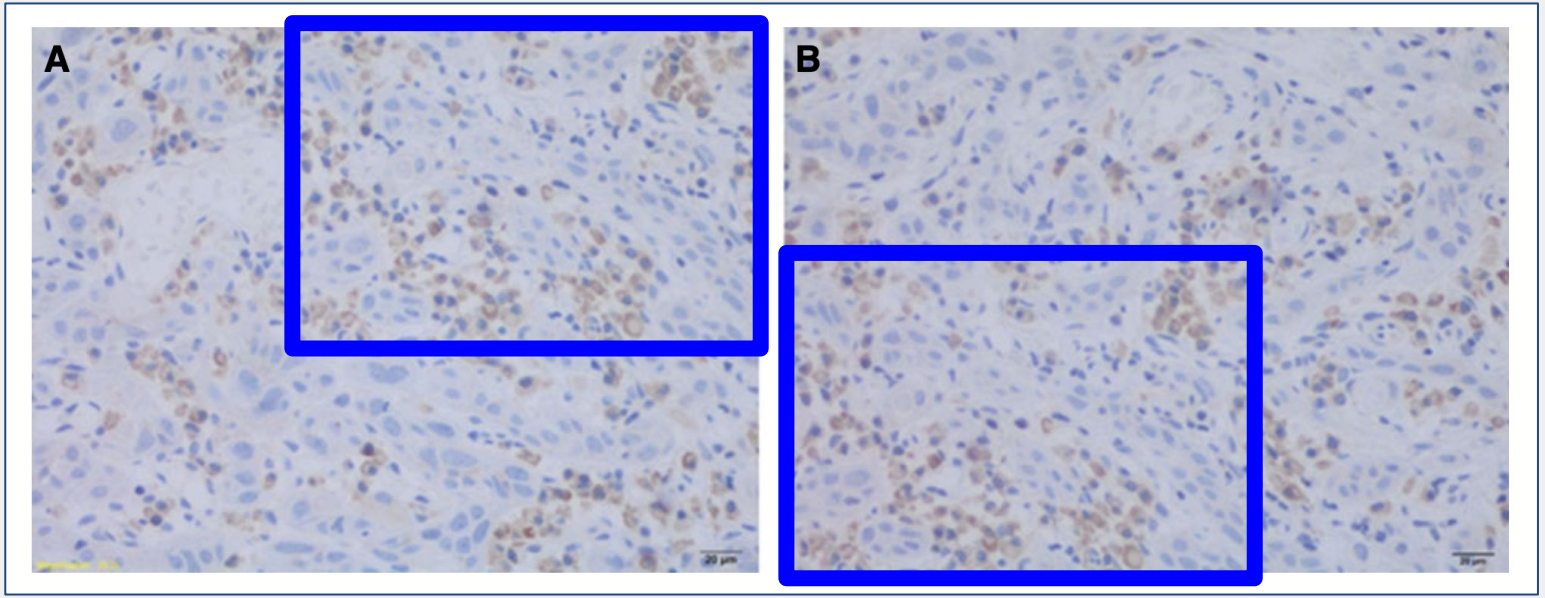
Oral Cancer *Buccal Cancer*



Department of Head & Neck Surgery, Fudan University Shanghai, China
J Oral Pathol Med (2014) - DOI: 10.1111/jop.12189
Reported online November 2011, corrected February 2022

Type II: Duplication with repositioning

Oral Cancer *Buccal Cancer*



Department of Head & Neck Surgery, Fudan University Shanghai, China
J Oral Pathol Med (2014) - DOI: 10.1111/jop.12189
Reported online November 2011, corrected February 2022

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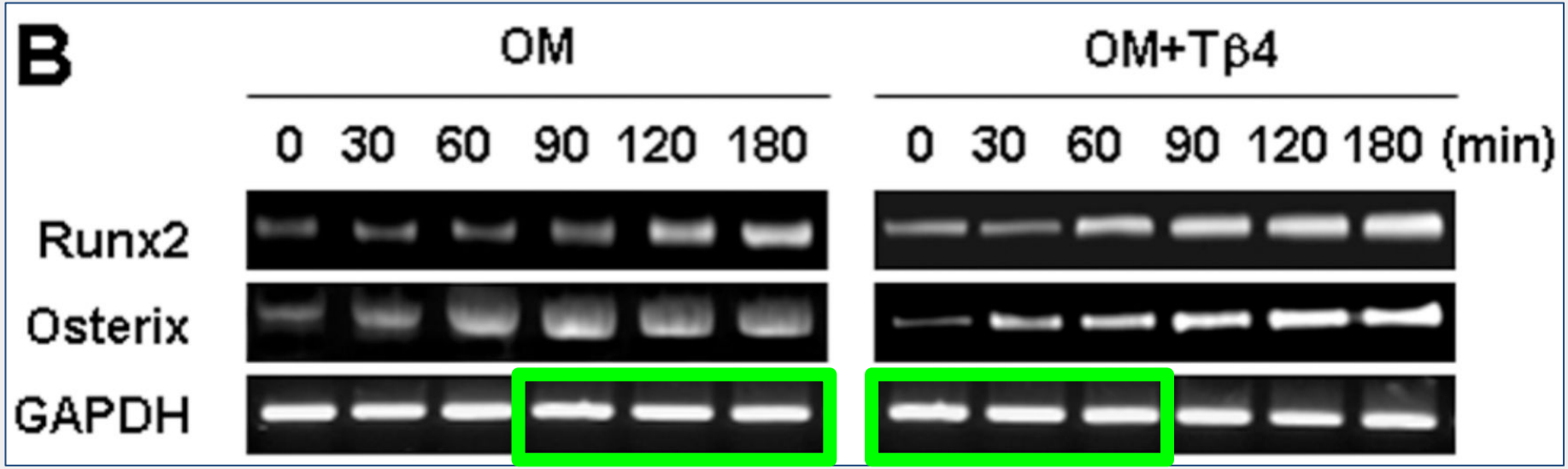
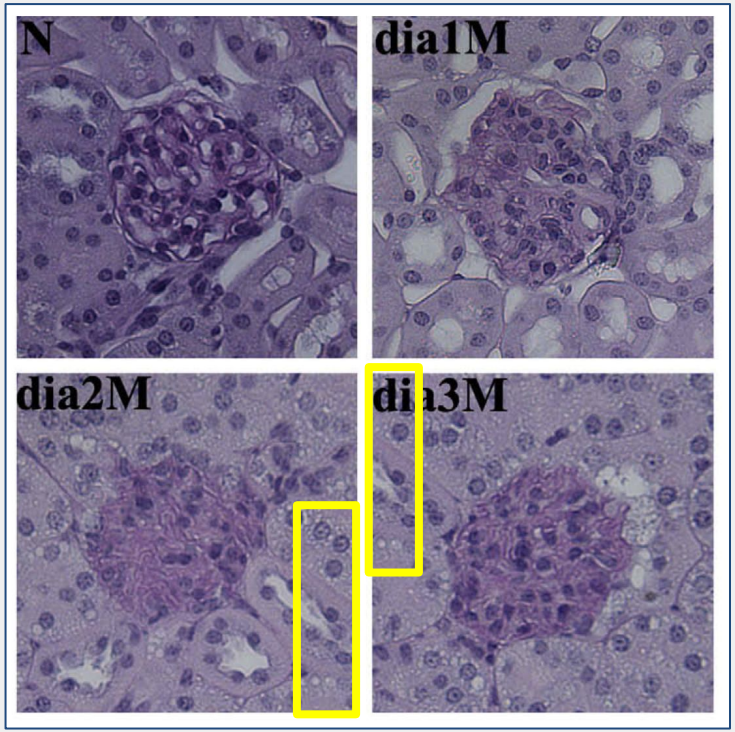
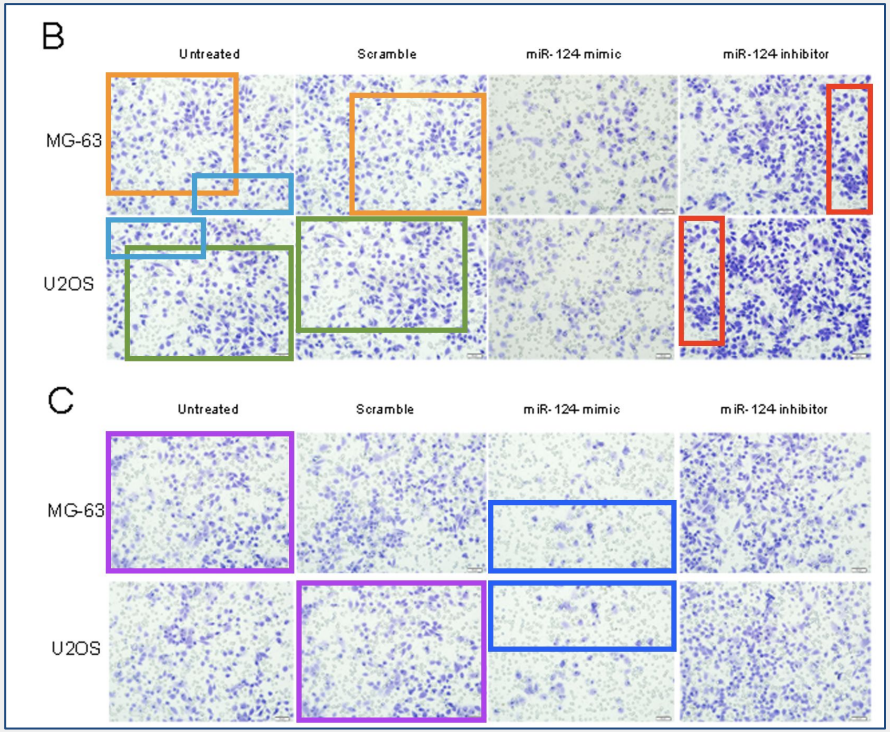


Odontogenic Differentiation in Human Dental Pulp Cells
School of Dentistry, Kyung Hee University, Seoul, Republic of Korea
PLOS ONE (2013), DOI: 10.1371/journal.pone.0061960
Reported to journal October 2015, no action yet

Type II: Duplication with repositioning

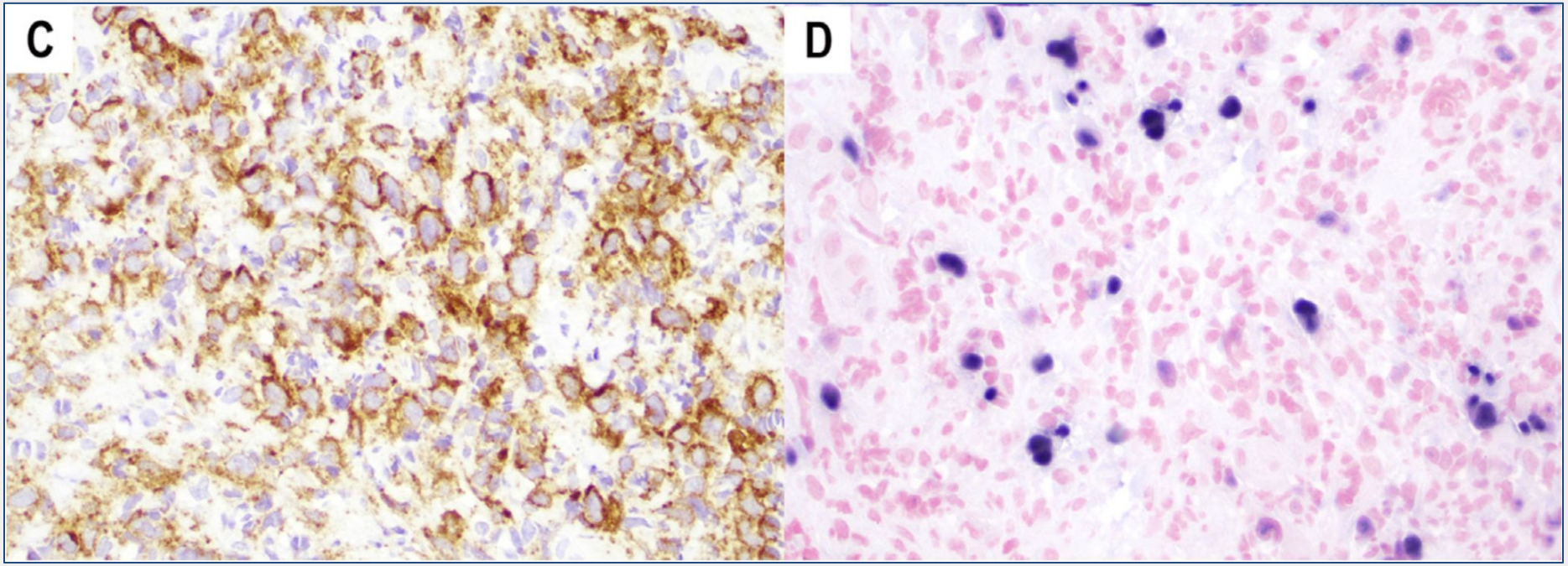


Yale School of Medicine, USA
J Autoimmunity (2009), DOI: 10.1016/j.jaut.2008.12.003,
Reported to journal in October 2015, not yet addressed



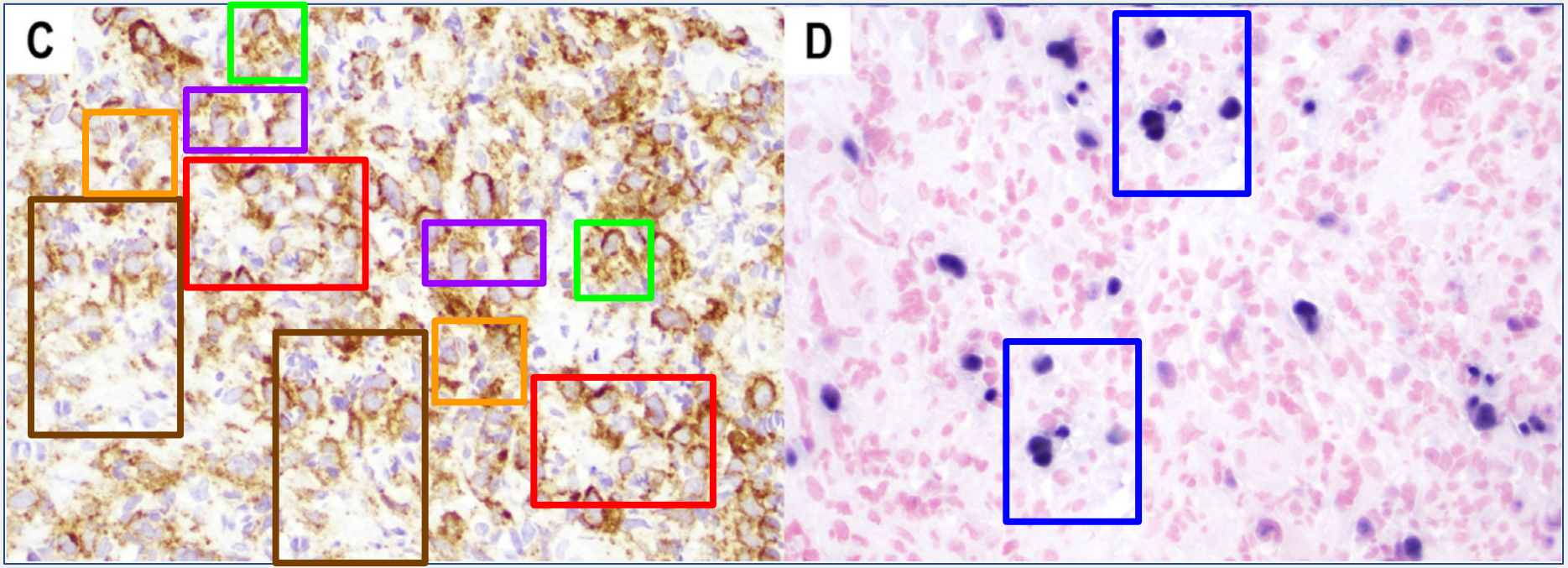
First Affiliated Hospital of Harbin Medical University, China
PLOS ONE (2014), DOI: 10.1371/journal.pone.0091566
Reported Oct 2015, retracted March 2019, cited by 27

Type III: Duplication with alteration



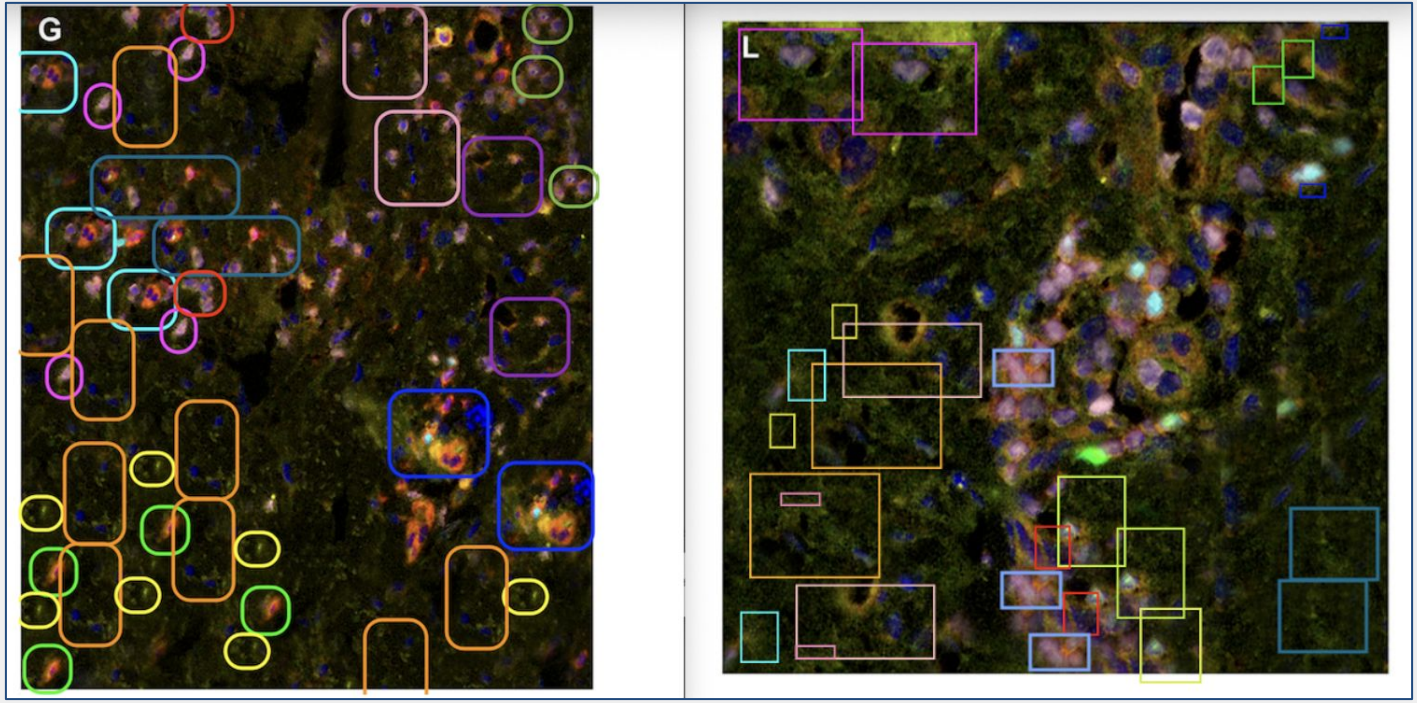
The University of Texas MD Anderson Cancer Center, Houston, TX,
Pathology (2020), DOI: 10.1016/j.pathol.2019.09.006
Reported online May 2023, no action yet

Type III: Duplication with alteration



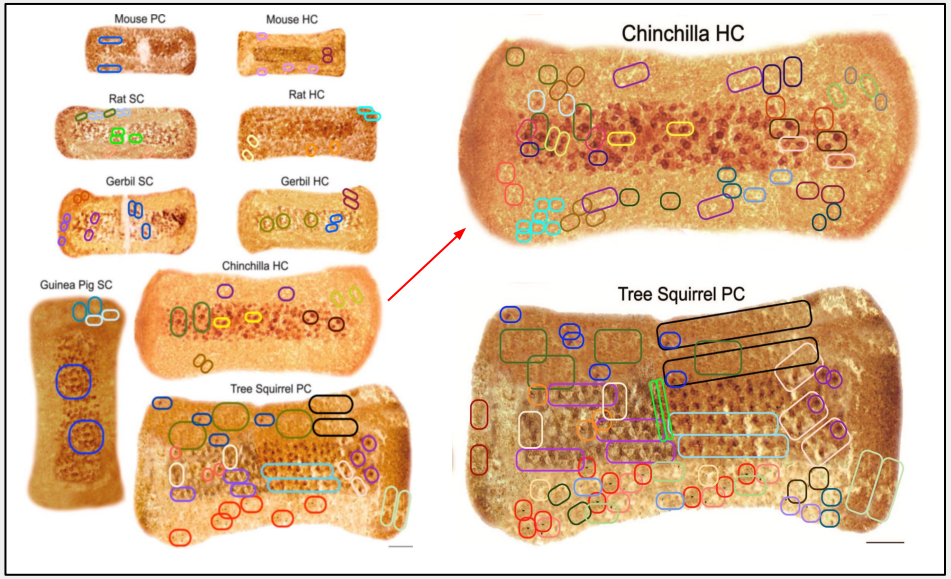
The University of Texas MD Anderson Cancer Center, Houston, TX,
Pathology (2020), DOI: 10.1016/j.pathol.2019.09.006
Reported online May 2023, no action yet

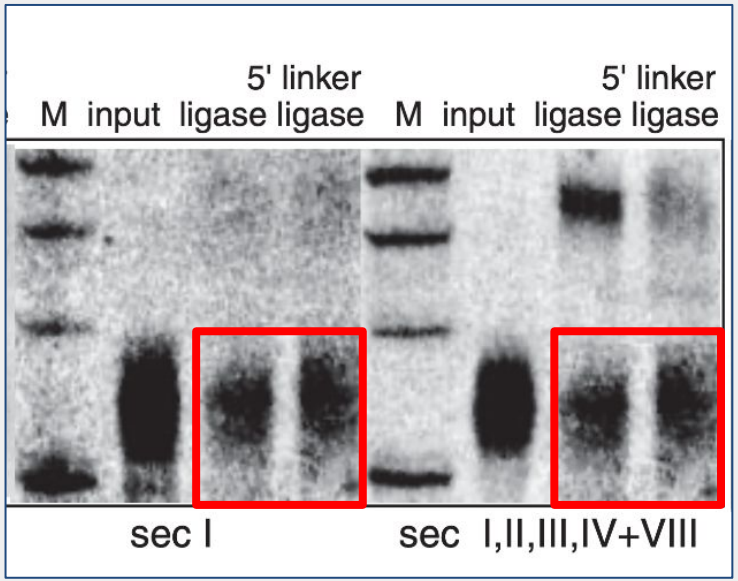
Type III: Duplication with alteration



University of Texas MD Anderson Cancer Center, Houston, TX
Frontiers in Oncology (2021), DOI: 10.3389/fonc.2021.621591.
Reported on PubPeer June 2023

Type III: Duplication with alteration

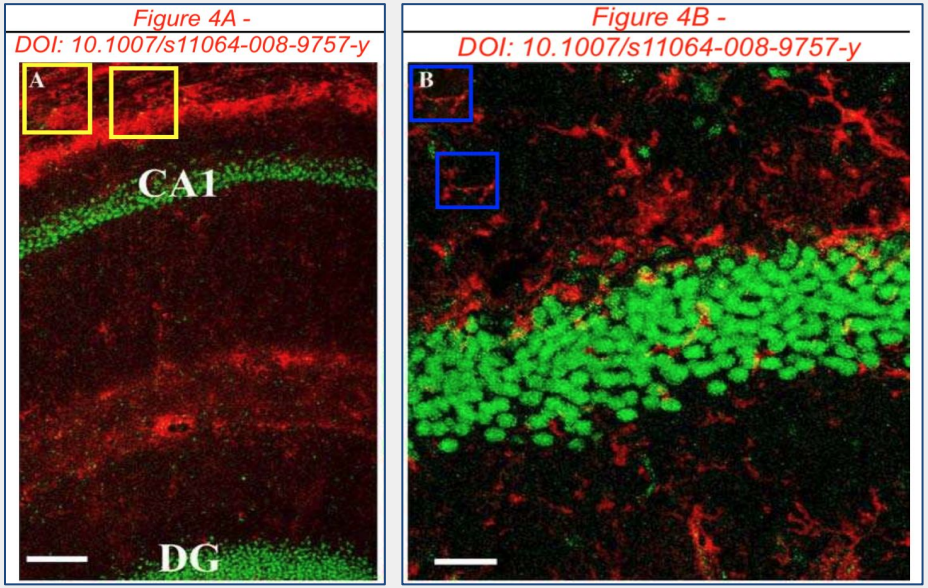




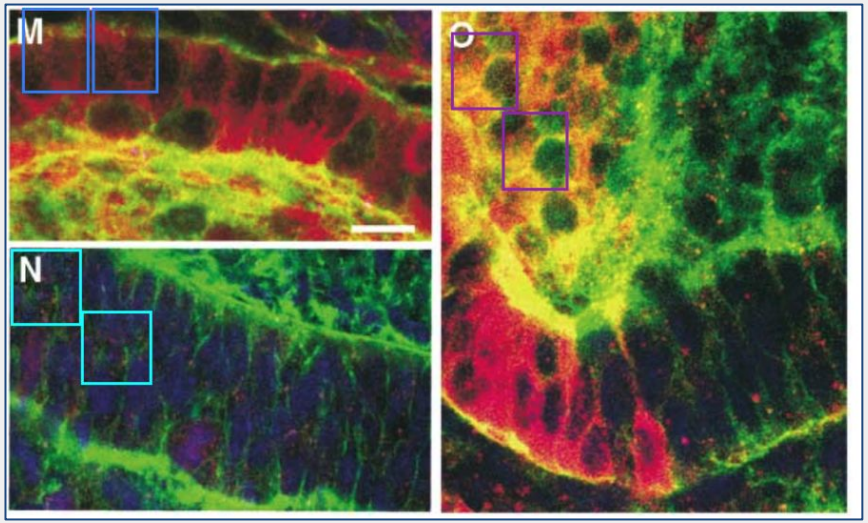
University of Illinois Chicago, cited 129 times
Journal of Neurophysiology (2005), DOI: 10.1152/jn.00747.2003
Reported to journal editors in June 2020; corrected March 2021

Hubrecht Laboratory (NIOB-KNAW), The Netherlands
Science (2007), DOI: 10.1126/science.1136699, cited 342 times
Reported to journal April 2015, retracted November 2020

Type III: Corner cloning (to replace labels)

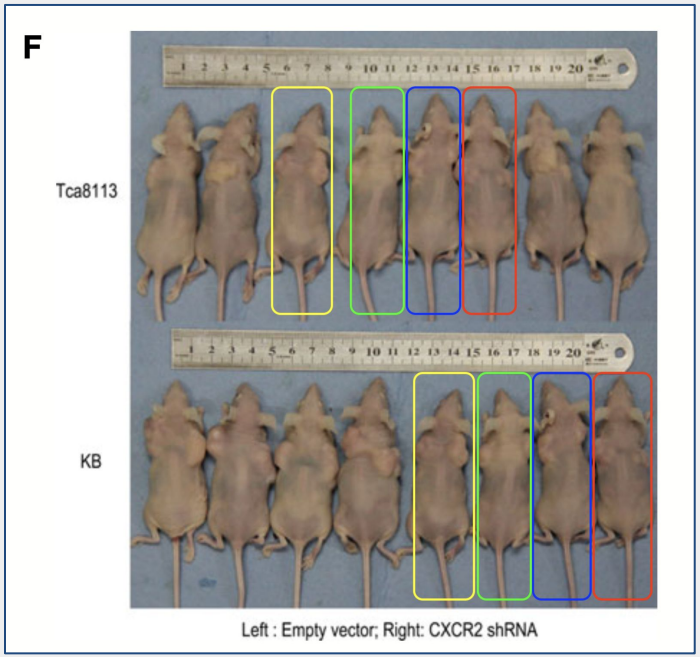


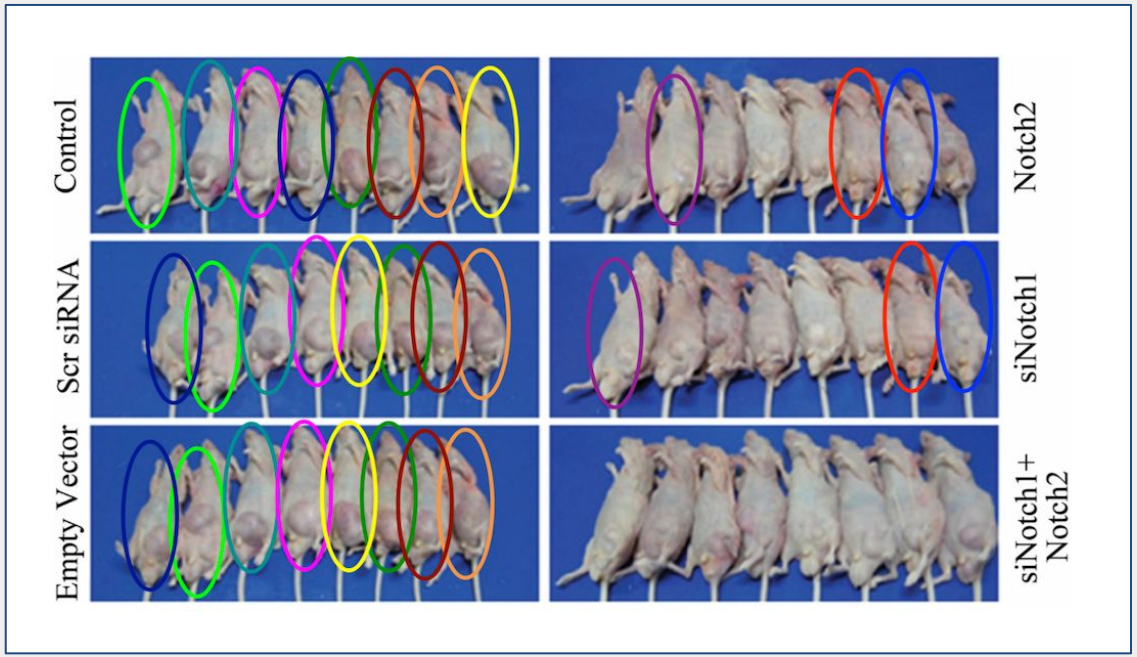
Nencki Institute of Experimental Biology, Poland
Neurochemical Research (2008)
doi: 10.1007/s11064-008-9757-y



Duke University Medical Center, NC, USA
Current Biology (2004) , DOI: 10.1126/science.1136699, cited 342 times
Reported to journal April 2015, retracted November 2020

Mouse reshuffling

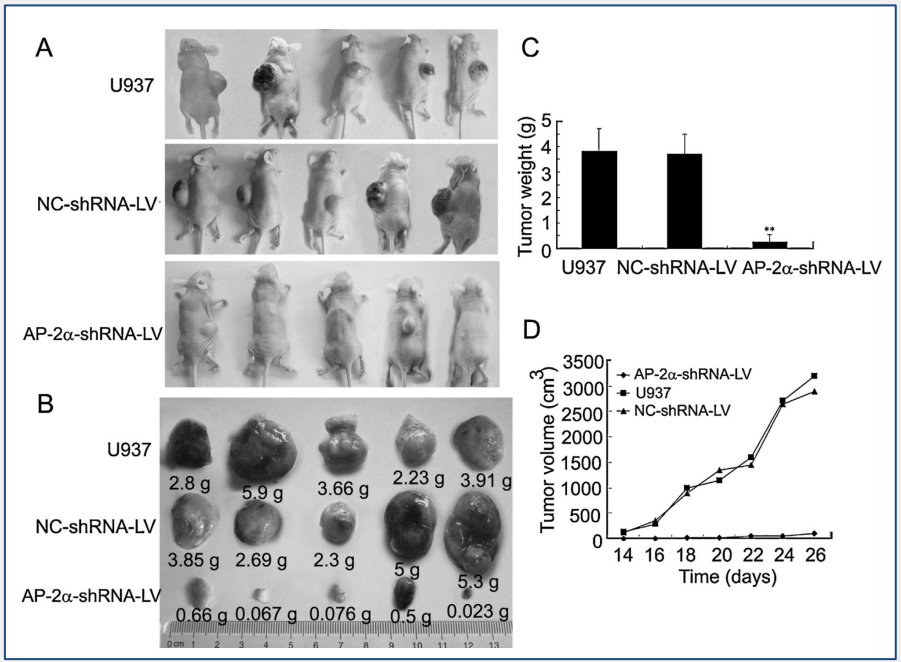




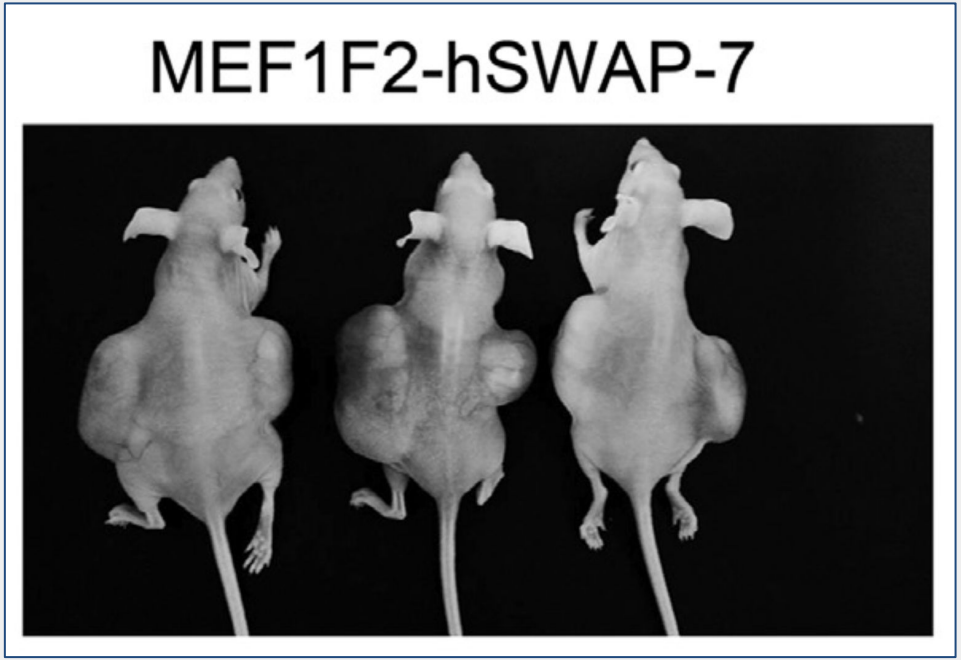
Fudan University, China
J Oral Path & Med (2014), DOI: 10.1111/jop.12189
Reported online February 2024

Tianjin Medical University General Hospital, China
PLoS ONE (2013), DOI: 10.1371/journal.pone.0053654
Reported to journal May 2014, retracted October 2019

Animal ethics



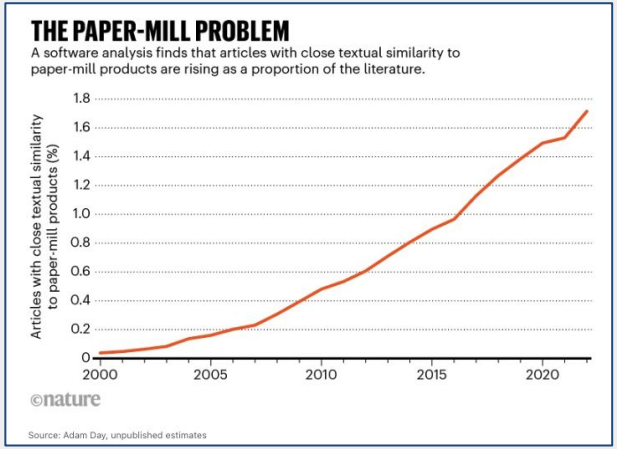
Hunan Normal University, China
Int J Biochem Cell Biol (2013), DOI: 10.1016/j.biocel.2013.04.024
Reported online March 2022, no action yet



National Health Research Institute, Taiwan
Exp Cell Res (2016), DOI: 10.1016/j.yexcr.2015.06.011
Reported online January 2020, no action yet

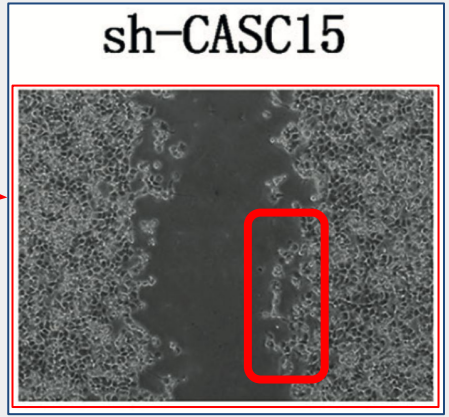
Scientific Paper Mills: Authorship for Sale

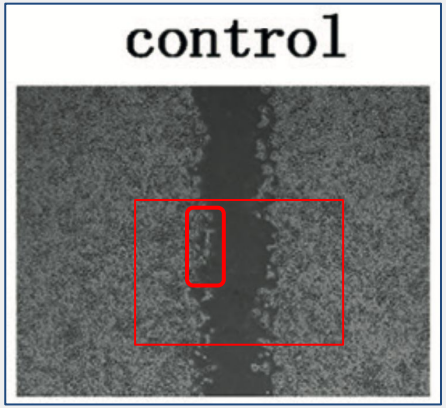
- For-profit scam networks selling authorships
- Already accepted papers - Special Issues
- Fabricated papers written by hired writers
- Plagiarized & Synonimized papers
- AI (LLM/chatbot)-generated review papers



'Stock photo' paper mill: 125 papers

Same photo in two papers from different sets of authors



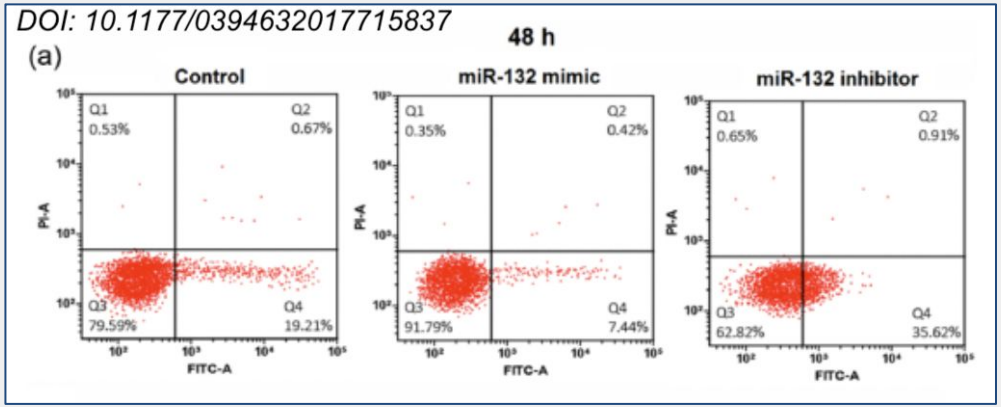


DOI: 10.26355/eurrev_201904_17689

DOI: 10.26355/eurrev_201910_19141

Unrealistic Flow Cytometry panels

DOI: 10.1177/0394632017715837



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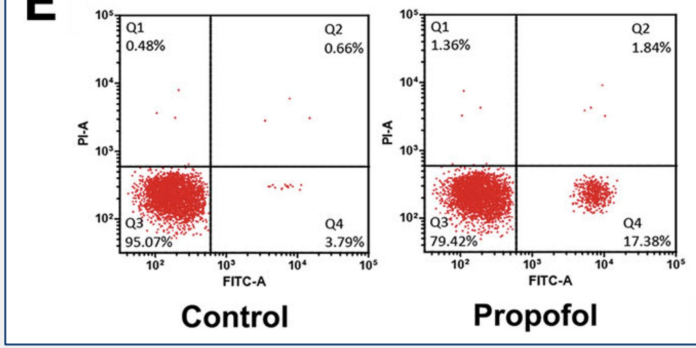
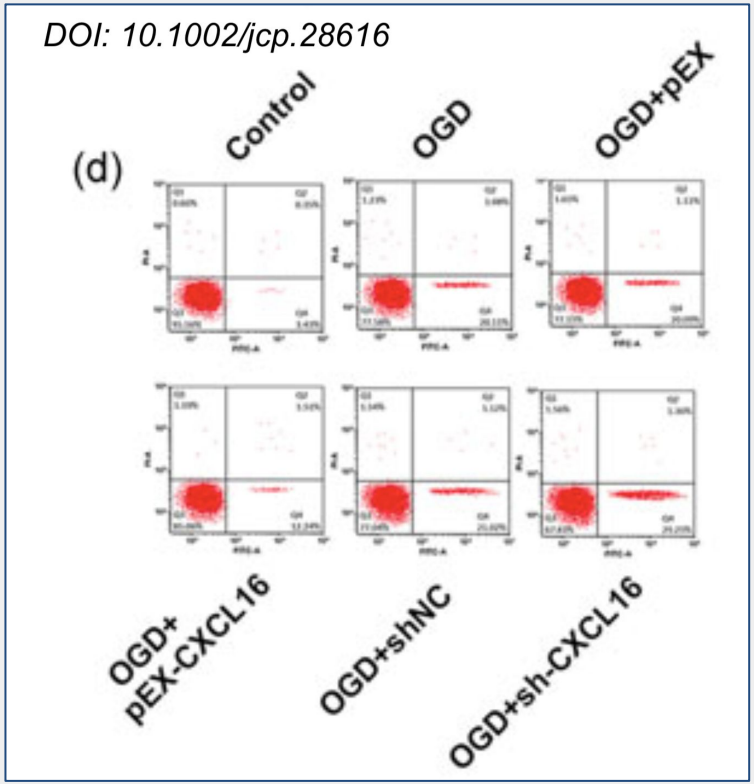


DOI: 10.1002/jcp.28616



Artificial intelligence can create fake images

Test Yourself: Which Faces Were Made by A.I.?

New York Times

By Stuart A. Thompson Jan. 19, 2024

Was this made by A.I.? 2/10

A.I. Real

Was this made by A.I.? 6/10

A.I. Real

Eliot Higgins
@EliotHiggins

Making pictures of Trump getting arrested while waiting for Trump's arrest.

10:22 PM · Mar 20, 2023 · **6.4M** Views

Deepfakes: A new threat to image fabrication in scientific publications?

Liansheng Wang,[1] Lianyu Zhou,[1] Wenxian Yang,[2] and Rongshan Yu[1,2,3,*]
[1]Department of Computer Science, School of Informatics, Xiamen University, Xiamen, China
[2]Aginome Scientific, Xiamen, China
[3]National Institute for Data Science in Health and Medicine, Xiamen University, Xiamen, China
*Correspondence: rsyu@xmu.edu.cn
https://doi.org/10.1016/j.patter.2022.100509

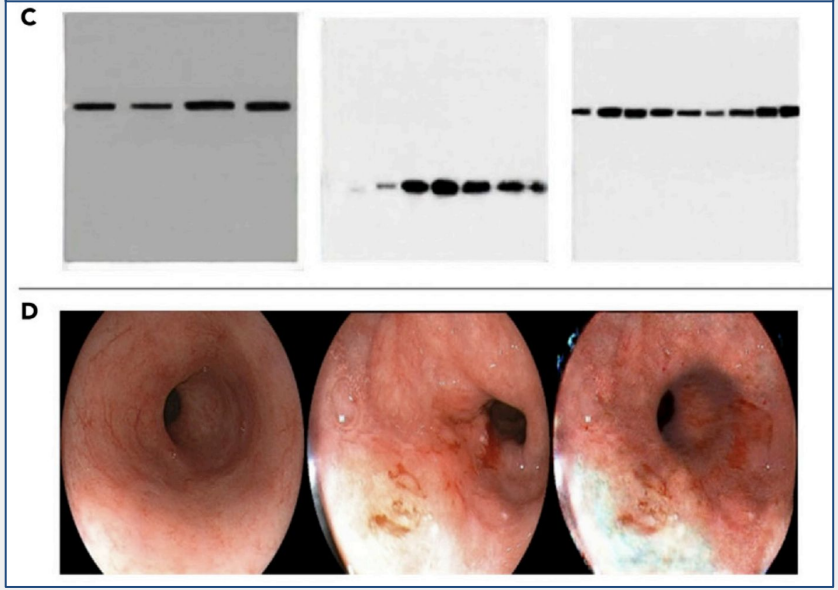


Image duplication detection software

NEWS | 21 December 2021

Richard Van Noorden, Nature (2021)

Journals adopt AI to spot duplicated images in manuscripts

A few publishers are using automated software to catch flaws in submitted papers.

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