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Green Histology

A Path to Building a Sustainable Lab

Advancing Cancer Diagnostics
Improving Lives

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Let’s take a moment of silence, in respect to our environment

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Objectives
What you will get out of today's session

- Gain an understanding of laboratory impact on the environment
- Learn best practices and understand what resources are available
- Define solutions to make your lab green … today!

Why this matters?

What Makes a Lab Green?

- Recycling
- Water conservation
- Renewable or energy efficient products
- Efficient processes
- Education

Why is this Important for Green Histology?

- Minimize the impact on our planet
- Our well-being
- Cost of waste management in the lab
- Discover a new sustainable process

Case Studies

- Physical Space
- Grossing
- Processing
- Embedding
- Microtomy
- Staining
- Archiving and Storage

Case Study #1
Hazardous Waste Management in the Laboratory

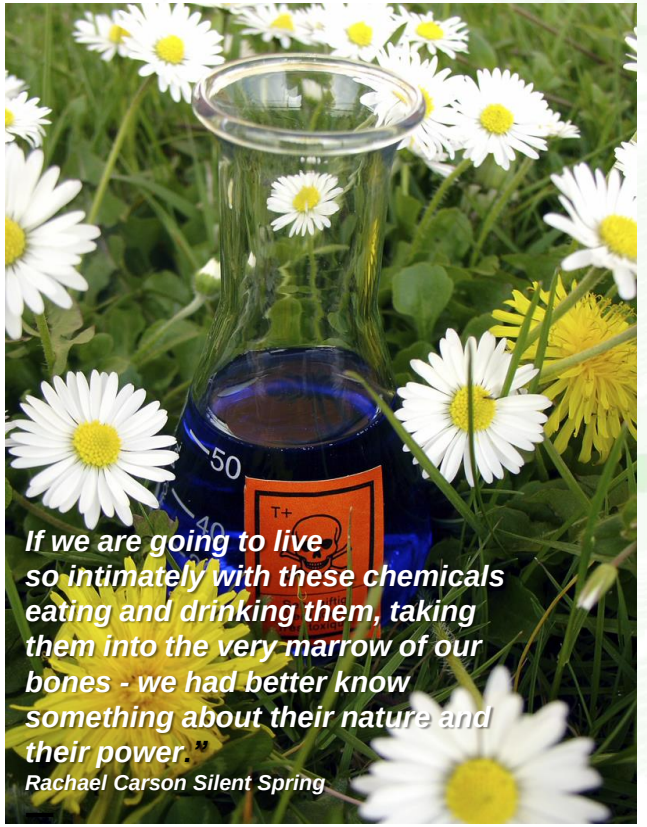
- Company: Laboratory XYZ
  - The EPA (Environmental Protection Agency) Issues Low Letter of Warning

- Problem
  - Hospitals waste viewed as hazardous waste
  - Lab XYZ must comply with MN EPA Regulations

- Solution
  - Chemical Inventories
  - Waste Stream Analysis
  - Hazardous Waste Training

Case Study #1
Hazardous Waste Management in the Laboratory

- Results:
  - Identification of hazardous waste in the laboratory
  - Minimize hazardous waste
  - Chemical inventory
  - Gatekeeper
  - Identifying mercury sources
  - Solvent recycling program
  - Redesign changes



Case Study #2
A Lab Gone Green!

- Laboratory Background
  - National clinical and anatomic reference lab
  - 2,600 employees

- Awards:
  - “Business Recycler of the Year”
  - “Best Place to Work”– 7 yrs.

- Followed simple EPA philosophy
  - Reduce - Reduced consumption of energy, natural resources and unsafe products
  - Reuse - Reused building materials and purchased reusable laboratory and office furniture
  - Recycle - Implemented a robust recycling program in a fiscally responsible manner

How they Reduced

Focus	Greener Steps	Results
Energy	○ Controlled lights by motion sensor ○ Automated temperature control ○ Incentives given to employees to encourage use of alternative transportation	○ Received a $75K rebate from energy co. ○ 700 employees (30%) use mass transit
Water	○ Installed automatic shut off water valves throughout lab	○ Reduced water usage by 80%
Supplies	○ “Green Seal” biodegradable cleaning chemicals used (80%) ○ Implemented electronic payroll and benefits management system	○ Saved 100 gallons per year of floor wax and stripper chemicals ○ Significantly reduced printing and paper use
Waste	○ Eliminated and/or reduced mercury ○ Reduced bio-hazardous waste ○ Educated employees on what is bio-hazardous ○ Controlled chemicals through inventory management	○ Chemical waste disposal costs significantly reduced ○ Reduced bio-hazard waste by 15% ○ Reduced expired reagent waste by 33%

How they Reused

Focus	Greener Steps	Results
Supplies	○ Renovated existing light fixtures and doors to meet green building standards versus purchasing new products ○ Installed reusable carpet tiles made of 35% recycled content in 1/3 of facility ○ Purchased new office furniture made with 40-60% recycled material ○ Standardized modular laboratory benches and shelving for simple reuse in other areas	○ Minimized facility expenses by re-using existing materials ○ Reused over 20,000 sq. feet of carpet ○ 100% of office and laboratory furniture is reusable

How they Recycled

Focus	Greener Steps	Results
Supplies	○ Installed separate recycling bins for paper, cardboard, glass and electronic waste throughout facility ○ Installed bins with lids to easily dispose of medical waste ○ Built a state-of-the-art recycling dock ○ Initiated ongoing educational activities on the value of being green	○ Significant reduction in waste overall ○ Use of recycling bins saves over $20,000 USD per year in hauling costs of waste
Waste	○ Currently recycling following items: ○ Paper, Plastics, Cardboard ○ Metal ○ Florescent bulbs ○ Brown glass ○ Batteries ○ Electronic equipment ○ Flammable waste reagents ○ Waste xylene	**Amount of waste reduction per year:** ○ Paper & plastic 288,000 lbs. ○ Shredded paper 225,000 lbs. ○ Expired docs 70,000 lbs. ○ Cardboard 100,000 lbs. ○ Metal 70,000 lbs. ○ Electronics 25,000 lbs. ○ Flammables 50,000 lbs. ○ Xylene 1,500 gal.

Case Study #2
A Lab Gone Green!

- Words of Wisdom:
  - Create a philosophy for your lab
  - Gain leadership support
  - Actively and continually educate
  - Start somewhere

Case Study #3
Savings Through Green

- Laboratory Background
  - A Pathology laboratory based out of Northwest United States
  - Provides a full range of laboratory services

- Results
  - “Saved as much as $180,000 annually”
  - “Technical assistance from Department of Ecology”

Case Study #3
Savings Through Green

- By reducing and recycling solvents and chemical waste
- They recovered 407 gallons of xylene and 522 gallons of ethanol saving the company $4600
- Philosophy: Reducing, Reusing, Recycling and saving money

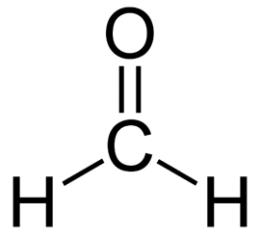
Case Study #3
Savings Through Green

1 SILVER

Silver nitrate is used for special stains and is considered hazardous waste. A method was developed to reuse the silver in jewelry or other art forms. By using this method no AgNo3 lab waste was generated despite the 2.5 times increase of silver nitrate in the lab.

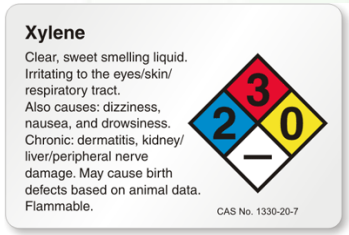
2 FORMALIN

A 10% buffered solution of formalin is used to fix tissue for routine histology. With more than 87,000 specimens a year they are recycling 1,800 gallons a year.



SOLVENT 3

Solvents are used throughout the histology lab. Xylene is a highly dangerous aromatic hydrocarbon used as a clearing agent in processing and staining. They are recycling 1096 gallons a year which equals about 4 gallons of xylene a day.



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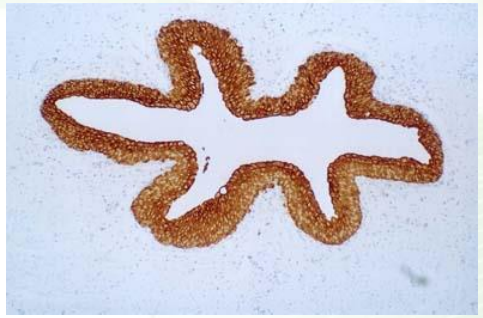
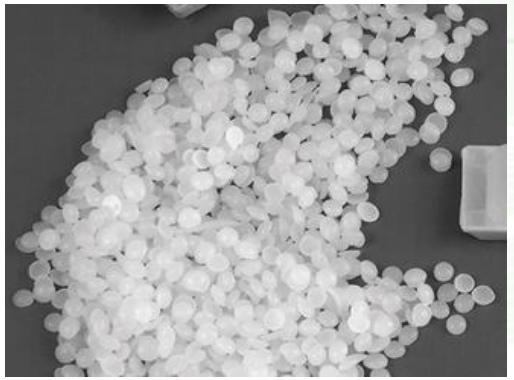
Case Study #3
Savings Through Green

3,3 Diaminobenzidine (DAB) is used in IHC staining to visualize proteins and nucleic acids. By rendering the mutagenic properties of the chemical inert. This allowed the dispose of 1,100 gallons of DAB mixed waste in one year as a much less hazardous substance.



Overtime paraffin becomes contaminated with solvents and needs to be replaced. In working, with a company that specializes in purifying mixed products, the company turned the labs paraffin into 7,800 pounds of fire-starting logs.



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Case Study #3
Savings Through Green

A program was started to recycle plastic containers with a company that specializes in recycled and reused plastic waste from the medical community. Together they are working on a process to clean and recycle their specimen bags. As a part of this process the lab is looking into using the companies biodegradable plastic that decomposes in 1-10 years as opposed to traditional 100+ years of decomposition.

They also buy formalin, alcohol and xylene in bulk 55 gallon drums. Which decreases the use of plastic and reduces the number of shipment and fewer single use containers.

Case Study #3
Savings Through Green

- By buying in bulk they maximized resources and minimized shipments
- All of these changes have reduced waste and prevented pollution and lowered cost
- Laboratory continues to look for ways to conserve resources while making a savings
- Created an inspiring environment

Case Study #4
Hazardous Waste Disposal

Hazardous Waste Disposal Costs for One Week (2010 data)

	Product A	Product B
# Slides	307	548
Total Waste	30 gallons	10 gallons
Waste/Slide	.10 gallons	.02 gallons
Cost/Slide	$0.30	$0.06
Cost/Week	$89.70	$26.90
Cost/Year	$4,664	$1,555
Waste handling labor/week	90 minutes	15 minutes

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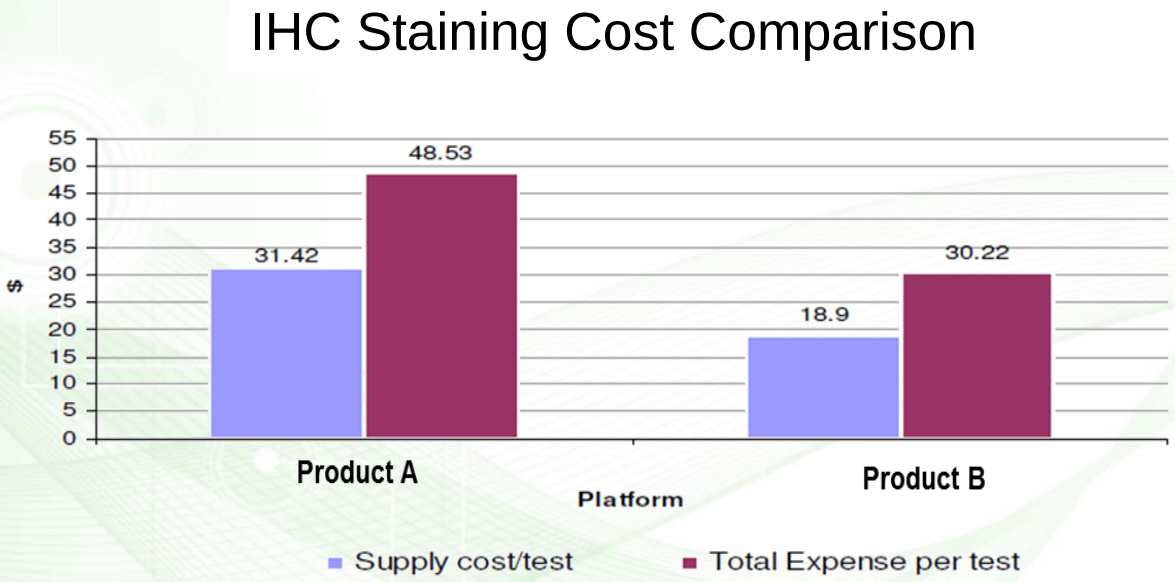
Case Study #4
Hazardous Waste Disposal



- From 07-09, their IHC volume grew from 11,502 to 19,688 billed tests annually.
- Migrating the majority of their stains to Product B platform has allowed them to sustain growth while staying within their flat-lined (no growth) expense and salary budgets
- For each stain they migrated from Product A to Product B, they saved an average of $18.31/ test.

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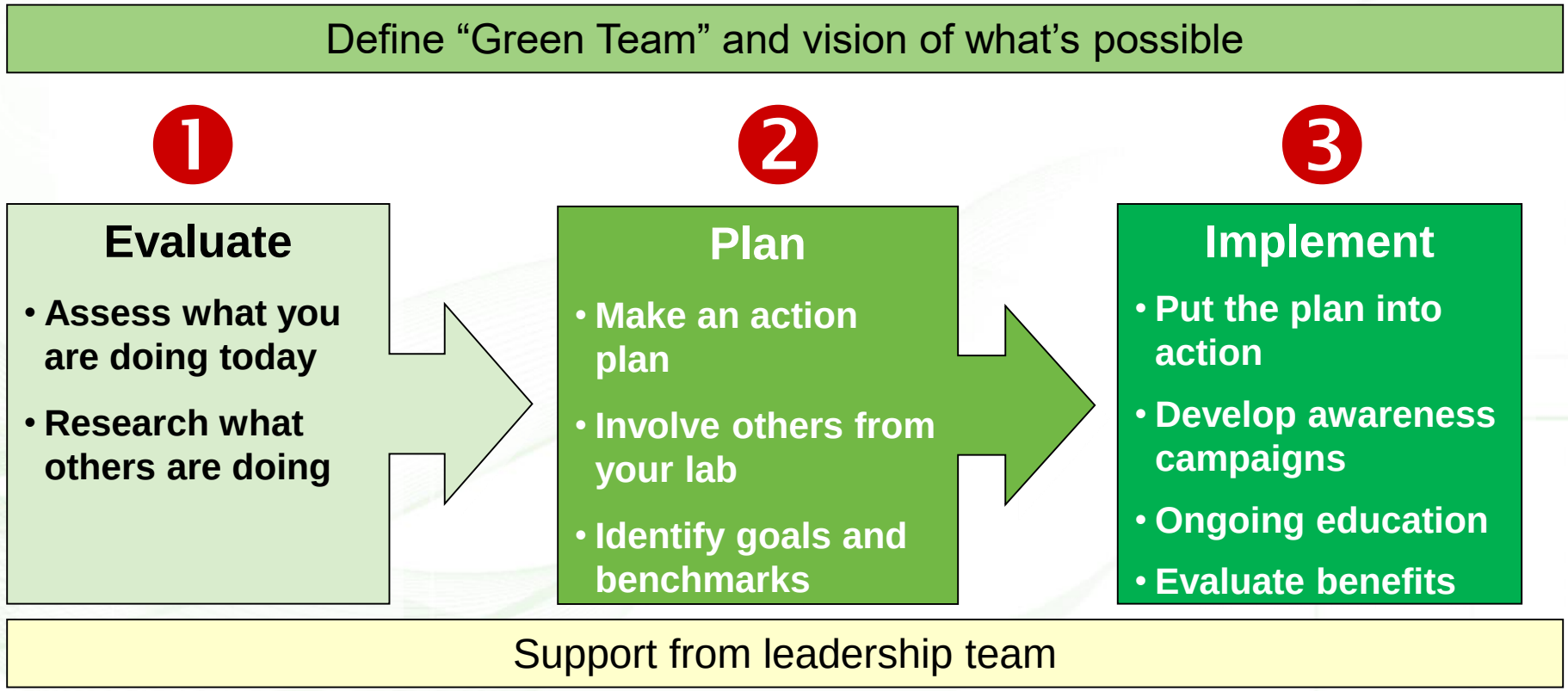
Case Study #5
Planting the Seeds to Go Green: The New Green Histology

- Conservation and Reduction
- The Challenges in Making Changes
- Available Resources – Evaluate
- Planning
- Implementation/ Results

http://apps.pathology.jhu.edu/blogs/pathology/new-green-histology

Ways You Can Green Your Lab: The 3-Step Roadmap



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Practical Solutions: Greening the Histology Lab

- Physical Space
- Grossing
- Processing
- Embedding
- Microtomy
- Staining
- Archiving and Storage

Physical Space

Current	Greener Steps	Benefit
Energy	○ Purchase of energy efficient products ○ Turn off lights ○ Maintain HVAC, change filters, monitor ○ Turn off equipment, take inventory	○ Saves energy ○ Financial savings
Water	○ Purchase water efficient products ○ Reduce water use ○ Monitor water usage ○ Washing lab ware use two sinks one for washing the other for rinsing	○ Financial savings ○ Less landfill space
Supplies	○ Take inventory of consumables ○ Order consumables before needed ○ Use green cleaning supplies, biodegradable, non toxic	○ Financial savings ○ Less hazardous impact
Waste	○ Reduce non-recyclable consumables ○ Recycle set-up in lab - organized bins	○ Financial savings ○ Less Landfill space

Get to Know Plastic Recycling Codes

Code	Examples
1	Water bottles, Soft drinks
2	Reagents, Chemicals, Cleaning Products
3	Pipes, Tubing, Wire Insulation
4	Plastics bags
5	Food and Drug containers
6	Plates, Cutlery, CD Holders, Aspirin bottles
7	Reusable water bottles

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Tracking Systems

Accessioning

Grossing

Embedding

Sectioning

IHC

Send-out

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Grossing

Current	Greener Steps	Benefit
Gloves	○ Maximize use of gloves ○ Find gloves that last longer	○ Reduce long term expense of materials, supplies ○ Less landfill
Fixatives	○ Eliminate hazardous reagents ○ Reduce waste ○ Reuse reagent ○ Explore alternative fixatives	○ Reduce long term expense of materials, supplies
Blades	○ Dispose properly ○ Reusable blades	○ Reduce long term expense of materials, supplies
Cassettes	○ Use cassettes with metal lids ○ Recycle cassettes ○ Use alternate cassette types	○ Reduce long term expense of materials, supplies

Processing

Current	Greener Steps	Benefit
Alcohol	○ Recycle bottle and reagent ○ Reduce use of reagent	○ Less landfill ○ Financial savings
Xylene	○ Recycle the reagent ○ Re-think: use alternatives	○ Less hazardous materials ○ Financial savings
Wax	○ Recycle the wax ○ Reduce the amount	○ Less landfill ○ Financial savings ○ Less waste
Instruments	○ Minimize reagent use ○ Recycle instruments	○ Financial savings ○ Less waste

Embedding

Current	Greener Steps	Benefit
Molds	○ Metal molds ○ Recyclable molds ○ Reusable molds	○ Less waste ○ Financial savings
Instruments	○ Efficient instruments ○ Updated instruments ○ Well-maintained instruments	○ Financial savings
Paraffin	○ Minimize paraffin ○ Rethink type of paraffin used	○ Less hazardous

Microtomy

Current	Greener Steps	Benefit
Blades	○ Maximize use of blades ○ Proper disposal of blades	○ Less landfill
Microtomes	○ Efficient instrument ○ New models of instrument ○ Well-maintained instrument	○ Less landfill ○ Financial savings
Slides	○ Proper disposal of slides ○ Rethink type of slides used ○ Minimize cutting unstained slides	○ Less landfill
Cryostats	○ Efficient instrument ○ New models of instrument ○ Eliminate plastic & freeze spray	○ Less impact to ozone ○ Less landfill

Staining

Current	Greener Steps	Benefit
Special Stains	○ Proper Disposal of stains ○ Elimination of mercury, B5 ○ Recycle Reagents	○ Less hazardous waste ○ Financial savings
IHC Stains	○ Minimize hazardous reagents ○ Separation of hazardous reagents ○ Proper disposal of reagents	○ Less hazardous waste ○ Financial savings
H&E Stains	○ Environmental friendly reagents ○ Minimize hazardous waste	○ Less impact on the environment
Instruments	○ Minimize the waste ○ Reagent efficient instruments	○ Less impact on the environment

Archiving and Storage

Current	Greener Steps	Benefit
Storage Containers	○ Recyclable products ○ Finding alternatives to filing systems	○ Less waste in landfills
Archiving	○ Electronic archiving ○ Eliminate paper	○ Less waste in landfills ○ Efficient documentation

Exercise Summary: Simple Things You Can Do Today

1. Physical Space	✓ Turn off lights
2. Grossing	✓ Maximize use of gloves
3. Processing	✓ Recycle reagent & bottles
4. Embedding	✓ Use recyclable molds
5. Microtomy	✓ Minimize cutting of unstained slides
6. Staining	✓ Share surplus chemicals
7. Archiving and Storage	✓ Use recyclable units

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You already make a difference in saving people's lives, now you have an opportunity to make a difference for the environment***..... making a difference forever.***

Thank You for Your Participation!

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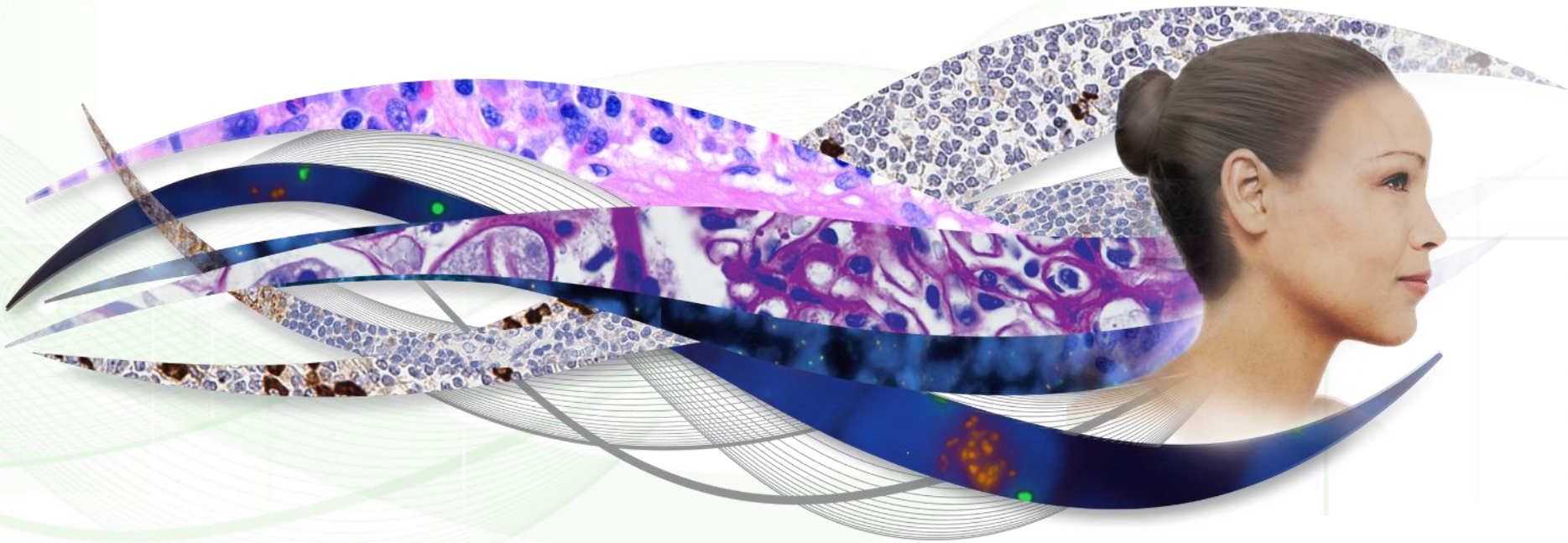
Support & Resources: Green Organizations

- www.earth911.com
- National Recycling Coalition - www.nrc-recycle.org
- Bioneers
- Biomimicry - www.biomimicryinstitute.org
- Earthjustice
- David Suzuki Foundation
- Green Your Work by Kim Carlson
- Practice Greenhealth
- www.labwasteguide.org



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