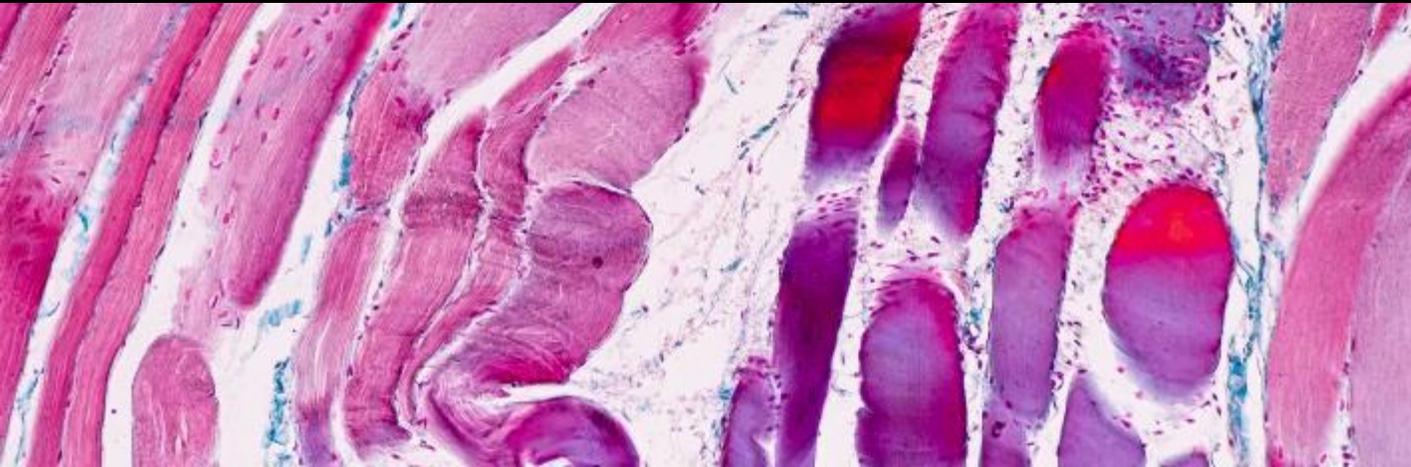




Workflow Productivity and Sample Security in the Pathology Laboratory

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The Importance of Proper Labeling for Sample Security



Inspection of many laboratories reveals a need for a revolutionary improvement in the way tissue samples are identified. Handwritten labels, transfer errors and manual sorting & storing create potential for patient tissue samples to be mixed up or misidentified.

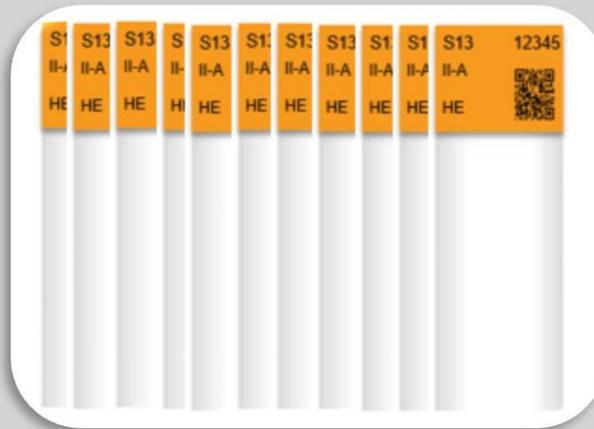
These mix-ups pose significant risks to patient safety, laboratory liability, and – even in the best cases – result in an unacceptable waste of precious time.

Current Methods for Labeling



Manual

Handwritten or adhesive labels for cassettes and slides



Batch

Allows for large number of data sets to be printed at once



On-Demand

Allows for printing of exact information when needed

Utilization of On-Demand Printing

Incorporating technologies and instruments with on-demand printing capabilities is the most effective way to minimize labeling errors throughout the lab.

Benefits of On-Demand Printing

- Printing directly onto the cassette/slide when information is needed reduces errors
- Helps maintain data integrity
- No mistakes by wrong withdrawal from batch
- No searching for missing slides / blocks
- No lost time for transport of slides/blocks

Challenges with Batch Printing

- Requires sorting through cassettes and slides for correct one
- Errors won't be detected until batch printing is complete; cassettes and slides are wasted if there are mistakes
- Printers are often shared; higher risk of sample mix-up
- Can produce excess cassettes and slides

Printing Technologies Used in Labeling Printers

Technology Type	Benefits	Challenges
Laser	<ul style="list-style-type: none">• Indelible print• High resolution - up to 100 characters• Fast print speed• No type or ink consumable required	<ul style="list-style-type: none">• Higher speed = lighter tone of the print• Initial up-front investment required
Thermal Transfer	<ul style="list-style-type: none">• High resolution - up to 85 characters• Fast print speed• Low running cost	<ul style="list-style-type: none">• Requires smooth, flat print face• Print is not fully chemical resistant
Ink Jet (UV Cured)	<ul style="list-style-type: none">• Print is more indelible than thermal transfer• Relatively quick print speed	<ul style="list-style-type: none">• Susceptible to ink blockage• Low resolution = low # of characters• High running cost
Ribbon (Hot Foil Tape)	<ul style="list-style-type: none">• Print is more indelible than thermal transfer• Low running costs	<ul style="list-style-type: none">• Low resolution = low # of characters• High cost associated with print head replacement• Slow print speed (8 to 16 sec/cassette)

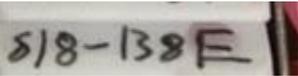
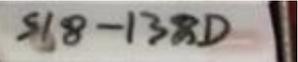
Advantages of Laser Printing Technology

- A laser produces razor-sharp edges with a high degree of contrast between the dark and light cells within the barcode on the cassette or slide.
- The cells are in correct proportion within the small and dense data matrix barcode which allows for more characters in the data.
- Lasers eliminate the use of ink, printheads and other parts that break easily.
- Laser printing is the most indelible (ink can still smudge or come off depending on certain reagents).



Risks of Handwritten Labeling for Sample Identification



- Handwriting is difficult to decipher
- Chemicals can damage handwritten text; labeling becomes less durable
- Time Consuming- time spent labeling as well as checking steps to identify
- Interpretation can be incorrect
 - Is this an “E” or an “F”? 
 - Is this an “8” or a “2”? 
- Barcoding is not possible
- Higher risk of sample mix-ups compared to other methods

Tissue Cassette Identification

- All tissue cassettes must be identified with a unique identifier.
- The unique identifier must be indelible throughout all subsequent procedures.
- The unique identifier can be applied manually or electronically using automated printers.
- Minimum requirements for a unique identifier include:
 - *Accession case identifier – to include year, subsection type (surgical, cytology etc.)*
 - *Specimen identifier – alpha or numeric*
 - *Block identifier – alpha or numeric*
- Additional identifiers to be used but not required:
 - *Laboratory name or identifier*
 - *Color coded cassette: tissue type, fixative used, pathologist etc.*
- Barcodes must not be the only identifying mark; a human readable identifier is also required.
- If a barcode is applied it should be readable by all tracking modalities used in the laboratory; LIS, Hospital Information system, associated testing equipment (slide writers) and third-party tracking software.



Slide Labeling

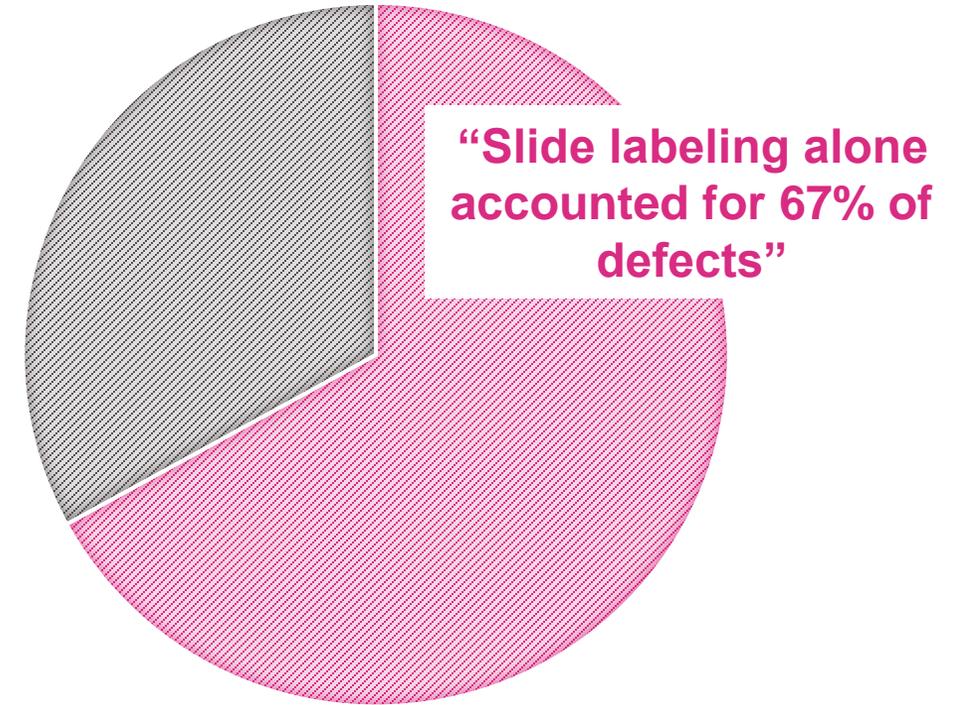
- All slides must be clearly labelled to identify the following:
 - *Specimen accession number*
 - *Block identifier*
 - *Slide level number*
 - *Patient name*
 - *Stain identifier*
- Establish a labeling procedure to be used; It is good laboratory practice to label slides only as required and to avoid the practice of pre-labeling large numbers of slides in advance.
- Establish a quality assurance process of matching slides against the block before delivery out of the laboratory.



The Importance of Accurate Labeling of Slides



Investigation by the American Society for Clinical Pathology*



***Source:** The Henry Ford Production Systems Defects and Waste in Surgical Pathology as a Basis for Quality Improvement Initiatives. ©2007 American Society for Clinical Pathology

Medical Identification Errors

- Identification errors exist due to the misidentification of a patient or a specimen. These errors can cause potential harm to patient diagnosis and safety.¹
- Patient identification errors in transfusion medicine occur in 0.05% of specimens; General laboratory specimens have a much higher rate, around 1%.¹
- Anatomic pathology, which involves multiple specimen transfers and hand-offs, may have the highest identification error rate.¹

John Hopkins Medicine USA:



Research found that diagnostic errors were the most common, most catastrophic and most costly of medical mistakes. 37.8% of diagnostic errors leading to death or serious, permanent disability were associated with misdiagnosed cancers.

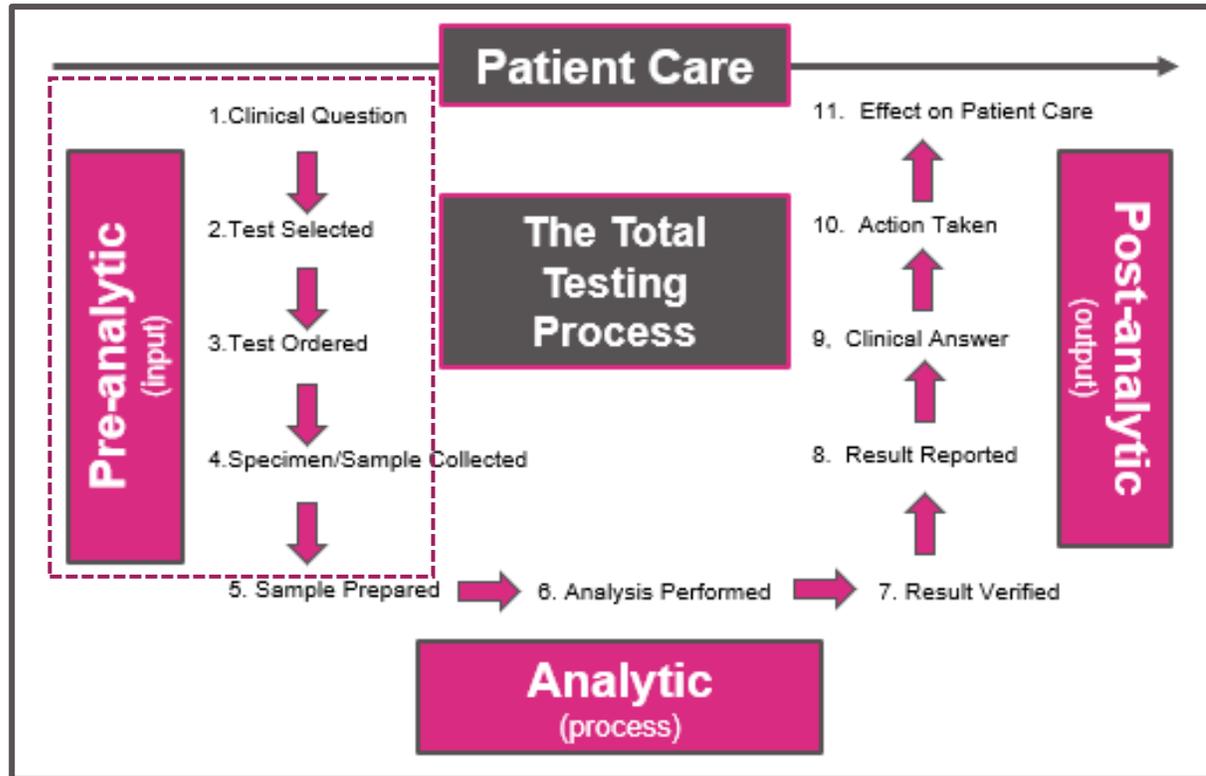
World Health Organization, March 2018:



“There is a 1 in a million chance of a person being harmed while travelling by plane. There is a 1 in 300 chance of a patient being harmed during health care.

Pre-Analytical Identification Errors

- Identification errors can occur during any part of the test cycle; however, most occur in the Pre-Analytic phase.¹
- Incorrect identification of patient is the 2nd highest error that occurs in the Pre-Analytic phase.



The process for lab testing begins and ends with the patient.²

Type of Error	Percent of Pre-Analytical Errors
Inaccurate Quality of Specimen	47%
Wrong Identification of the Patient	26.8%
Missing Physician Order	14%
Inappropriate Quantity of Specimen	11.6%
Use of Inappropriate Container	0.6%

Pre-Analytical errors in laboratory testing.²

Implications of Labeling Errors for Patient Safety

- Mislabeling events can lead to catastrophic outcomes such as **misdiagnosis**, consequential **delays in cancer diagnoses**, or **unnecessary major surgical procedures**.
- Accuracy of patient/specimen identification is one of the main priorities for improvement to patient safety in the lab.

Lynne Yurosko was wrongly diagnosed with breast cancer in 2006 due to a labeling error

whose bodily tissues and/or slides prepared therefrom were marked with the name and identification of Lynne Yurosko, were initially diagnosed as breast cancer and caused the plaintiff to be informed, diagnosed and treated for breast cancer, have been informed that: (i) the initial interpretation of their bodily tissue by Quest was incorrect; (ii) the appropriate interpretation of said tissue was breast cancer; (iii) the aforesaid error was that of Quest in its error in labeling, identifying and marking of the tissue and/or slides prepared therefrom and (iv) this cancer required immediate treatment, are both determined as hereinafter provided:

\$2.5 million verdict against RUMC in cancer misdiagnosis; biopsy slides mixed-up



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on October 08, 2015 at 3:54 PM, updated October 12, 2015 at 2:35 PM

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STATEN ISLAND, N.Y. -- Five years ago, Zoraida Zambrana received the diagnosis no one wants to hear: Cancer.

Just 41 and determined to beat thymic cancer, a rare cancer of the thymus gland in the chest, the Fort Wadsworth resident underwent three months of painful chemotherapy.

But the treatment didn't work, and doctors were puzzled. Until they made a startling discovery.

Zambrana didn't have cancer.

Further research revealed her biopsy slides had been mixed up at Richmond University Medical Center with those of another patient, who, in fact, had thymic cancer, said Thomas Giuffra, Zambrana's lawyer.

On Tuesday, a jury found Richmond University liable for Zambrana's pain and suffering. She was awarded \$2.5 million in damages in what Giuffra said was the first civil verdict reached at the new Staten Island Courthouse in St. George.

Errors such as this are not only detrimental to patients but have gigantic financial consequences.

Prevention of Labeling Errors for Patient Safety

- **Adoption of best practices/guidelines and providing barcode printers to labs can reduce error rates in labeling.**
 - *CAP/NSH recommends 2 unique identifiers, 2D barcodes and the use of a printer to ensure legibility and indelible labeling.*
- **Technology, including 2D bar-coding for specimen labels can be easily incorporated into lab systems.**
- **Utilizing on-demand printing for cassettes and slides is the most effective way to minimize to dramatically minimize labeling errors.**
- **Improvements for accurate labeling will benefit labs and patients and can prevent errors in the pre-analytical phases.**



Solutions for Workflow Productivity and Sample Security

Epredia Cassette and Slide Printers

Epredia's Printer Portfolio

Epredia's offering of cassette and slide printers provide high-quality printing solutions that increases productivity in the labeling process and eliminates errors seen in other forms of labeling.

Epredia Cassette Printers



Nova

Vega

PrintMate

Epredia's offers a suite of cassette printers for on-demand printing to meet all lab types' needs. This includes laser printing for the highest resolution and quality labeling options for cassettes.

Epredia Slide Printers



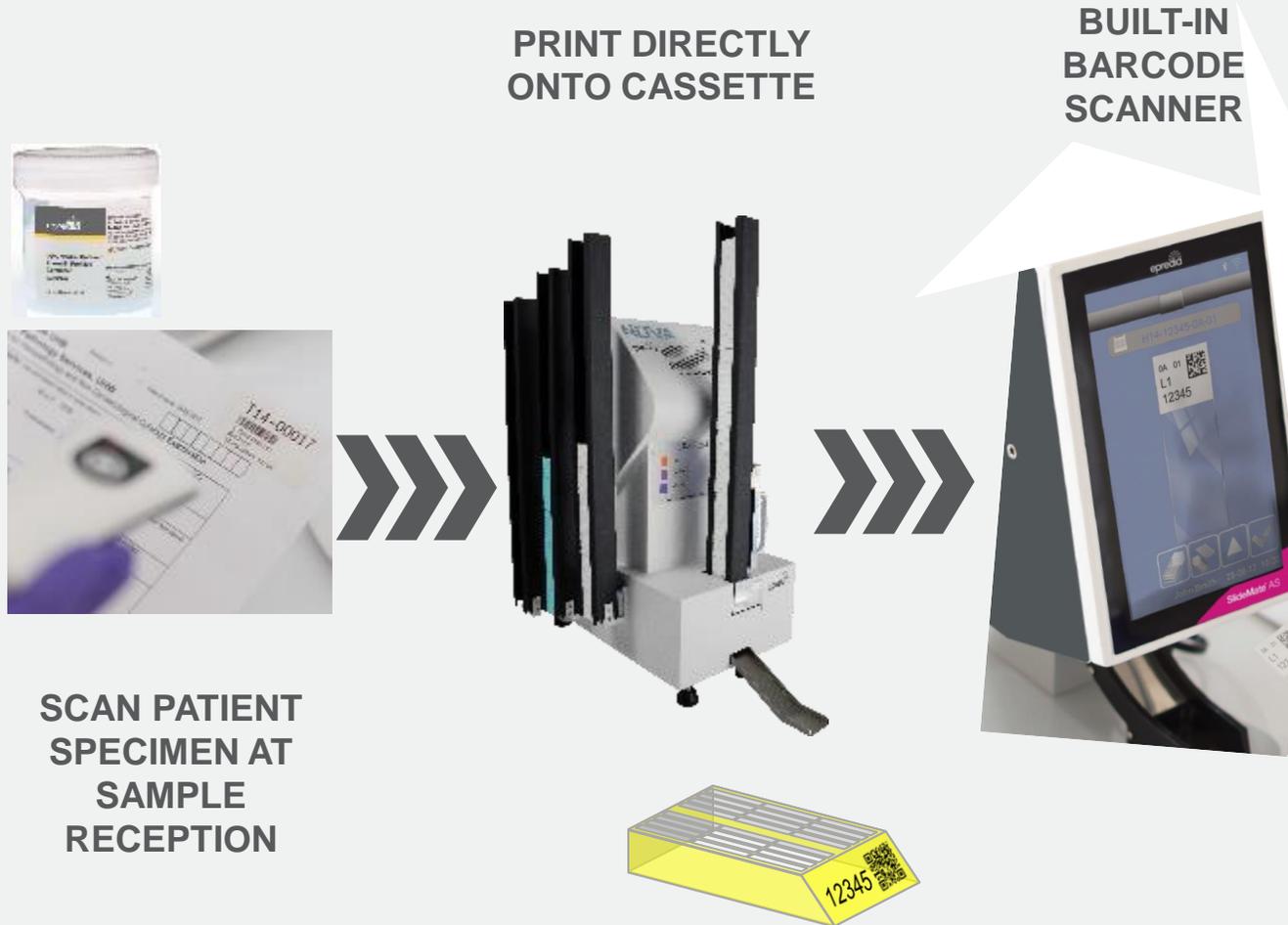
SlideMate AS

SlideMate Pro

Epredia's SlideMate family of slide printers for on-demand printing provides smart solutions with flexible configurations to increase productivity and efficiency in the workflow and eliminate errors.

Create Efficiency and Increase Accuracy for Patient Safety

The use of on-demand printing eliminates errors and increase accurate sample identification in the laboratory



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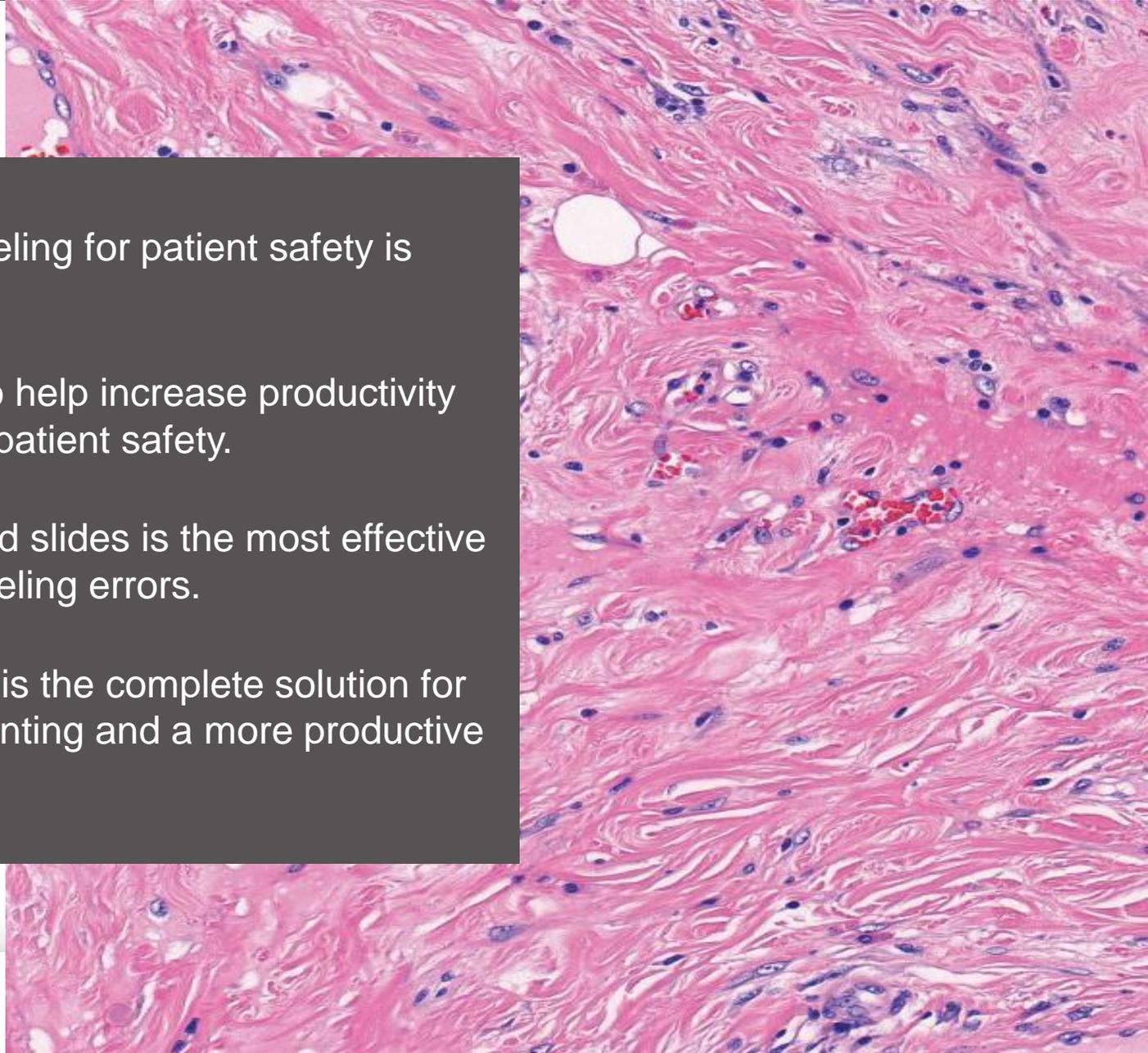
Create Efficiency and Increase Accuracy for Patient Safety

The use of on-demand printing eliminates errors and increase accurate sample identification in the laboratory



Summary

- Reducing errors and improving quality of labeling for patient safety is critical in the lab.
- There are technologies and tools available to help increase productivity in the labeling workflows as well as improve patient safety.
- Utilizing on-demand printing for cassettes and slides is the most effective way to minimize to dramatically minimize labeling errors.
- EpreDia's suite of cassette and slide printers is the complete solution for on-demand printing for the highest quality printing and a more productive workflow across all labeling steps.



Thank You for Attending



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