

Periodic Acid-Schiff staining of breast tumors in Paget's disease

Student's Name

Institutional Affiliation

Course Name

Professor's Name

Due Date

Breast tumor and Periodic Acid-Schiff stain:

Detection of polysaccharides and mucosubstances using a PAS-D Stain is a staining approach that has been developed. Glycogen, glycolipids, glycoproteins, and mucins are only a few examples of biomolecules that include carbohydrates. Periodic Acid-Schiff stain is an abbreviation for the term.

Because it can highlight molecules with high carbohydrate content, it is one of the most frequently performed techniques in the histopathology laboratory (Wang et al.,2017). Glycogen, fungus, mucin, and the basement membrane of the skin are examples of such substances that exist in the body. Here, however, I will focus on breast tumors.

The color of PAS Stain and the histologic characteristics associated with it are as follows:

- The color magenta represents basement membranes, glycogen, fungal species, and mucus substances.
- Nuclei are represented by the color blue.
- Other tissue components are represented by the color green.

It is possible to perform a PAS-D stain using diastase (dialysis). Glycogen and other PAS-positive components present in the tissue sample are the primary goals of this test. Mucin is a good illustration of this concept.

It can only be detected after glycogen has been digested and washed away with diastase. People who have tumors may benefit from such a process since it allows them to distinguish glycogen from other types of granules, something they may not be able to do using different methods.

What is the purpose of the PAS-D stain?

It stains structures containing a high concentration of carbohydrate macromolecules, typically found in connective tissues, basal laminae, mucus, and glycocalyx, among others. It helps diagnose various medical disorders, such as Paget's breast disease, a rare condition ((Ishizuki & Nakamura,2021).

Chemistry of this method:

What is the procedure for performing it?

Ingredients/Materials that are required:

- i. Acid solution regularly
- ii. Periodic acid is a type of acid that occurs regularly.
- iii. Distilled water is water that has been filtered.
- iv. Schiff's Reagent is a chemical compound that is used in the production of Schiff's Reagent.
- v. Fuchsin fundamental
- vi. Sodium metabisulfite is a compound that contains sodium metabisulfite.
- vii. Distilled water is water that has been filtered.
- viii. Activated charcoal is a type of charcoal that has been activated
- ix. Hydrochloric acid in concentrated form

Procedure

- I. Bring the sections to the distilled water and soak them in a periodic acid solution for around five minutes to disinfect them.
- II. Rinse with distilled water after each use.
- III. For approximately 15 minutes, cover it with Schiff's reagent.
- IV. Rinse for approximately 10 minutes under running tap water.

- V. Herri's hematoxylin was used to counterstain the area for approximately 15 seconds.
- VI. If necessary, make a distinction between the two by applying acid alcohol and bluing.
- VII. Rinse with tap water and increasing concentrations of alcohol until the water runs clear.
- VIII. Clear the surface with xylene and install it

Principle of PAS-D Staining:

Initial reaction - The first reaction uses a periodic acid, which functions as an oxidizing agent in the first reaction. It oxidizes the carbon-to-carbon bonds that exist between two adjacent hydroxyl groups, causing them to break down. The outcome is the Schiff reactive aldehyde groups, which are a product of the reaction.

The second reaction will be carried out using a Schiff reagent, and the tissue portion will react with the reagent. Sulfuric acid, sodium metabisulphite, hydrochloric acid, and basic fuchsin are all components of the reagent. The basic fuchsin included in the mixture will react with the aldehyde groups present in the tissues, causing them to become toxic. When a vivid magenta color appears, you will see that there has been a reaction (Pujar et al., 2017).

Finally, when the piece is rinsed in water, the fuchsin molecule will generate a brilliant magenta hue due to the reaction. The greater the number of hydroxyl groups present, the brighter the color. It is possible to see other tissue elements present in the section using a counterstaining agent, such as haematoxylin, used in some cases. To demonstrate fungal organisms, a light green counterstain is often utilized.

REFERENCES

- Ishizuki, S. & Nakamura, Y. (2021). Extramammary Paget's Disease: Diagnosis, Pathogenesis, and Treatment with Focus on Recent Developments. *Current Oncology*, 28(4), 2969–2986.
<https://doi.org/10.3390/curroncol28040260>
- Wang, M. Z., Guo, R., & Lehman, J. S. (2017). Correlation between histopathologic features and likelihood of identifying superficial dermatophytosis with periodic acid Schiff-diastase staining: a cohort study. *Journal of Cutaneous Pathology*, 44(2), 152–157.
<https://doi.org/10.1111/cup.12865>
- Pujar, A., Pereira, T., Tamgadge, A., Bhalerao, S., & Tamgadge, S. (2017). Comparing The Efficacy of Hematoxylin and Eosin, Periodic Acid Schiff and Fluorescent Periodic Acid Schiff-Acriflavine Techniques for Demonstration of Basement Membrane in Oral Lichen Planus: A Histochemical Study. *Indian Journal of Dermatology*, 60(5), 450–455.
<https://doi.org/10.4103/0019-5154.159626>