Difference Between Immunocytochemistry and Immunohistochemistry

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Key Difference – Immunocytochemistry vs Immunohistochemistry

Immunocytochemistry (ICC) and Immunohistochemistry (IHC) are two widely used techniques in molecular diagnostics, which identifies and confirms the occurrence of both noncommunicable diseases and communicable diseases based on the molecular markers present on cells. The key difference immunocytochemistry and immunohistochemistry is the molecule that is used as the analysis procedure in these techniques. **In ICC, primary and secondary antibodies conjugated with markers such as fluorescence are used whereas IHC, monoclonal and polyclonal antibodies are used for the diagnostic determinations.**

What is Immunocytochemistry (ICC)?

ICC uses primary and secondary antibodies bound to markers such as fluorescent markers or enzymes and is a powerful detection method to detect antigens present on target cells which can either be infectious cellular particles or cancerous tumor cells. Three types of controls are required for immunocytochemistry.

- Primary Antibody – control that shows the specificity of the primary antibody binding to the antigen
- Secondary Antibody – control that shows that label is specific to the primary antibody
- Label Controls – show the labeling is the result of the label added and not the result of endogenous labeling.

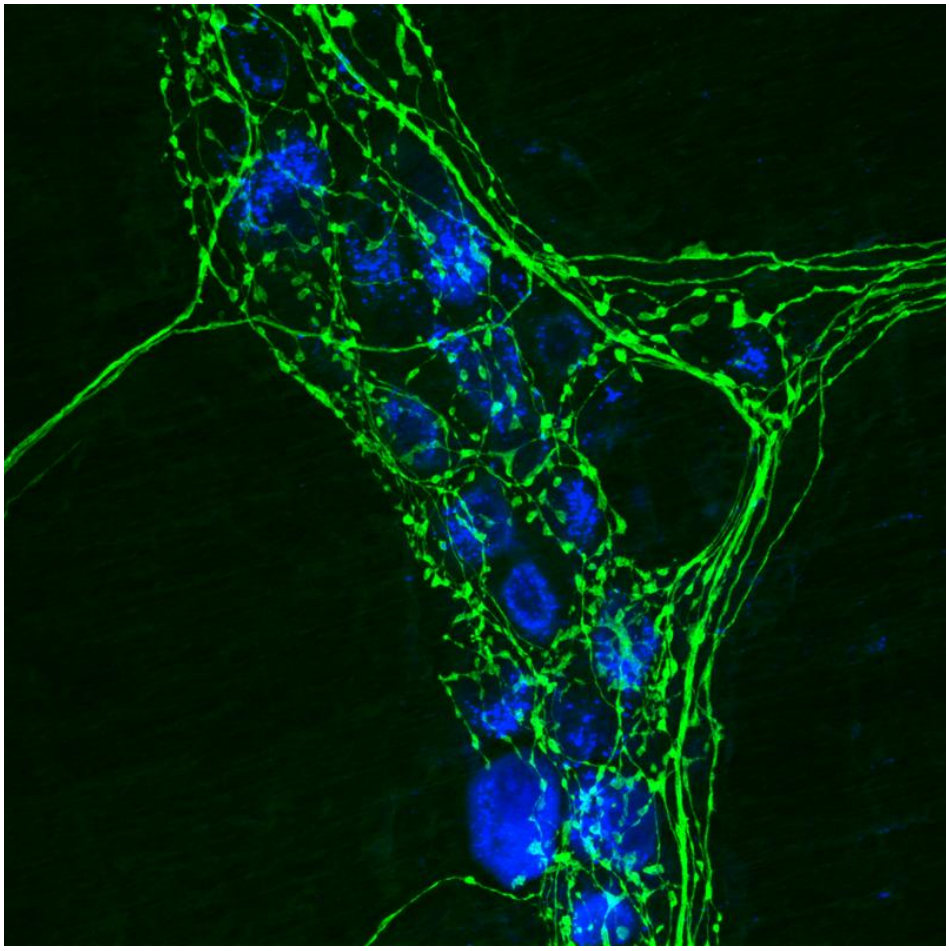

Figure 01: Immunocytochemistry labels individual proteins within cells (here, Tyrosine hydroxylase in the axons of sympathetic autonomic neurons are shown in green).

The primary antibody control is specific for each new antibody and cannot be repeated for each experiment. The secondary antibody control is designed based on the primary antibody utilized in the experiment and is included with each experiment. The labeling control is included if a condition of the procedure is changed, the sample is changed, or when unexpected labeling is found.

The two main applications of ICC are Radio Immuno – Assay (RIA) and Enzyme Linked Immunosorbent Assay (ELISA). The most common antibody used is the immunoglobulin G.

What is Immunohistochemistry (IHC)?

In Immunohistochemistry, the source sample contains monoclonal and polyclonal antibodies in order to determine the presence of antigens in foreign cells. This technique is based on the specific reaction of antigen-antibody binding. The antibodies

used in detection can be tagged with different markers; they can be fluorescence markers, radiolabeled markers or chemical markers. Through facilitating *in vitro* binding between the antigen and the targeted antibody, the presence or the absence of a particular protein of a cell can be determined. Currently, scientists are involved in developing target antibodies for specific antigens present in cells that can either develop as malignant tumor cells or antigens present in infectious agents such as HIV.

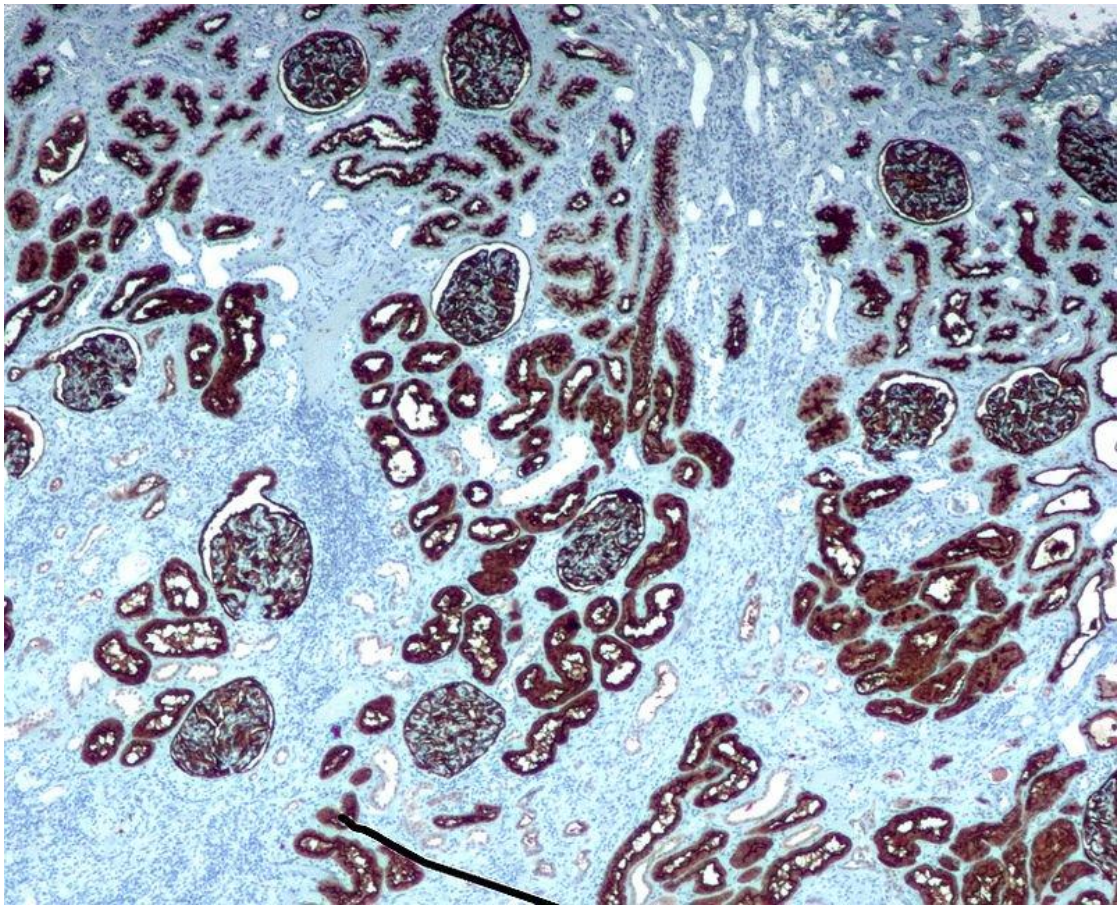

Figure 02: Immunohistochemical staining of normal kidney with CD10

What are the similarities between Immunocytochemistry and Immunohistochemistry?

- Reactions are highly specific and accurate in ICC and IHC.
- The applications of ICC and IHC include cancer and infectious diseases diagnostics.
- Sterile conditions should be maintained in both conditions, and they should be performed in *in vitro*
- Both techniques provide reproducible results.
- Both are rapid.

- Radio labeling, fluorescence techniques are used as detection methods in both ICC and IHC.
- Both are based on antigen-antibody pairing.

What is the difference between Immunocytochemistry and Immunohistochemistry?

Type I vs Type II Restriction Enzyme	
ICC uses primary and secondary antibodies bound markers such as fluorescent markers or enzymes and is a powerful detection method to detect antigens present on target cells.	IHC is a method that uses monoclonal and polyclonal antibodies to determine the presence of antigens which are special protein markers placed on the cell surfaces.
Sample Source	
Samples derived from tissues that have been histologically processed into thin sections are used in ICC.	IHC uses samples consisting of cells grown in a monolayer or cells in suspension which are deposited on a slide.
Sample Processing	
In ICC, cells should be permeable to facilitate antibody penetration to the intracellular targets.	In IHC, cells are formalin-fixed, paraffin-embedded before staining.

Summary – Immunocytochemistry vs Immunohistochemistry

Molecular diagnostics is used to identify and confirm the occurrence of both noncommunicable diseases and communicable diseases based on the molecular markers present on cells. Molecular markers can be proteins or sequences of DNA or RNA; development of technologies such as ICC and IHC have paved the way for scientists to identify the disease and its cause at an early stage. Both ICC and IHC depends on the specific reactions between antibody and antigen although the sample source. The main difference between immunocytochemistry and immunohistochemistry is the sample processing of the two procedures.

References:

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2. Duraiyan, Jeyapradha, et al. “Applications of immunohistochemistry.” Journal of Pharmacy &Bioallied Sciences, Medknow Publications & Media Pvt Ltd, Aug. 2012, Available here. Accessed 24 Aug. 2017.

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