Data Sharing, Handling, and Access

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IMMUNOATLAS: AN ONLINE PUBLIC PORTAL FOR SHARING, VISUALIZING, AND REFERENCING MULTIPLEX IMMUNOHISTOCHEMISTRY/IMMUNOFLUORESCENCE (MIHC/IF) IMAGES AND RESULTS FOR IMMUNO-ONCOLOGY

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Background Recent advances in multiplex immunohistochemistry/immunofluorescence (mIHC/IF) technologies have enabled simultaneous measurements of large numbers of markers on the same tissue sections, and more comprehensive views of the cellular compositions and immune responses of the tumor microenvironment. However, the reproducibility and interpretation of the complex staining patterns and analysis results obtained from these markers remain major barriers to more general adoptions of these technologies. Here, we report the availability of an online public portal, “ImmunoAtlas”, which would enable researchers/clinicians to present or share their published mIHC/IF images or results; international workgroups to create and share standard marker panels or assay guidelines; end users to validate antibodies or protocols; or computational scientists to benchmark different analysis methods on standard reference images (figure 1).

Methods ImmunoAtlas is based on a HistoPathological image management and Analysis (HPA) software platform developed by us, and hosted in the data center of Bioinformatics Institute. The platform uses the cellXpress software,¹ which is written in C++ and supports parallel processing, to efficiently process and manage large numbers of huge mIHC/IF or brightfield images. The web interface of ImmunoAtlas is also completely developed by us in PHP and JavaScript to address the specific needs and requirements in managing these images.

Results ImmunoAtlas is a user-friendly online portal for sharing, visualizing, and referencing original tissue images and analysis results (<https://ImmunoAtlas.org>). We have completed the first phase of development of the portal. Users can now perform image uploading, annotation, publishing, sharing, and viewing with standard web browsers on desktop computers or mobile devices/phones (figure 2). The portal supports image files from common microscopes and slide scanners, and can process mIHC/IF or brightfield images from selected areas, tissues microarrays, or whole slides. It can handle up to 1000 multiplexed markers, and whole-slide images that are >20GB/image. Several internal and external immuno-oncology studies have deposited and shared their images via ImmunoAtlas. They include a study of multiplexed PD-L1 markers in breast cancers²; the development of a panel of 56 highly-multiplexed markers for cutaneous T cell lymphoma³; and a study of CD38 scoring in hepatocellular carcinoma.⁴

Conclusions ImmunoAtlas promotes open science and collaborations that can accelerate the adoptions of mIHC/IF technologies in immuno-oncology. The next phase of development will focus on adding image searching and comparison functions to the portal. The community is welcome to use and share their images and analysis results via the portal.

Abstract 627 Figure 1 Key target users and applications of ImmunoAtlas

Abstract 627 Figure 2 ImmunoAtlas' web interface for sharing and visualizing mIHC

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