**In 2021, despite the Covid-19 pandemic, the Unit was able to return to its usual levels of workload and services, even exceeding expectations in some specific areas.**

**OVERVIEW**

Pathology is the branch of science devoted to the study of the structural, biochemical and functional changes in cells, tissues and organs undergoing disease. The Histopathology Unit offers support and expertise through a full range of services covering paraffin embedding and tissue sections to histochemical stains; research and diagnostic immunohistochemistry (IHC) testing; antibody validation; hybridization techniques (including in situ hybridization) of tissue microarrays; slide digitalisation; image analysis; and quantification. The Unit collaborates with CNIO researchers in the slide digitalisation; image analysis; and quantification. The specialised technicians, such as laser-capture microdissection; value-added services implemented by a team of highly specialised technicians, such as laser-capture microdissection, slide digitalisation, image analysis; and quantification. The Unit collaborates with CNIO researchers in the histopathological characterisation of animal models of disease, providing them with the required pathology expertise. In addition, the Unit offers its portfolio of services to other institutions, including hospitals, research centres and private companies.

**RESEARCH HIGHLIGHTS**

In 2021, the Unit was able to return to the standard levels of workload and services recorded before the pandemic and, in some specific areas, such as immunohistochemistry and image digitalisation and analysis, even exceeded expectations. Thus, more than 26,000 paraffin blocks of tissue samples were generated, and ca. 21,000 techniques were performed, including histological and IHC techniques (with dual and triple staining being increasingly in demand). in situ chromogenic hybridization, tissue microarrays, slide scanning, etc.

During 2021, we made significant progress in digitalising our material, with approximately 35% of all the slides generated converted to digital files. In addition, 10% of these were subjected to image analysis and quantification.

We also consolidated the in situ hybridization technology for mRNA detection (RNAScope), with 160 cases analysed, some of them with double staining, using the Ventana-Roche automatic platform for IHC stains. This new technology enables efficient detection of specific mRNAs directly on sections from formalin-fixed paraffin-embedded (FFPE) tissues, thus providing a spatial dimension to gene expression analysis. The applications of this new technology are manifold, e.g., as an alternative to IHC whenever it is difficult to find specific antibodies working well on FFPE tissues, or to validate results from other technologies, among others.

The high quality of the techniques run by the Unit continues being endorsed by External Quality Assessment Schemes. In this respect, our histochemical techniques were evaluated by UK NEQAS. Similarly, NordiQC and SEAP have evaluated a subset of our IHC techniques under different modules, including general markers, breast cancer markers and PD-L1; these all obtained good scores.

Training and outreach activities are also a critical component of the Unit’s activities. Although some of the usual activities in this area were compromised due to the pandemic, the Unit was still able to participate in a Master’s course on oncology research, in online format, and we hosted a pre-doctoral student for a short training stay on immunohistochemistry techniques during the last quarter of the year.

**PUBLICATIONS**


**FIGURE** Example of dual IHC staining. The image shows a picture of an islet of Langerhans in the pancreas, with double staining for insulin (brown) and glucagon (Teal, blue). It can be seen that the insulin staining is homogeneous across the islet, whereas glucagon is localised more in the periphery of the islet.