The Molecular Diagnostics Unit (MDU) is entrusted to provide our National Health System’s hospitals with a wide range of sensitive, specific, reliable, and updated assays. By using gold-standard molecular techniques, we routinely identify alterations in the sequence or expression of key genes that are involved in cancer and that could in turn be used in the diagnosis and/or prognosis of patients, the detection of minimal residual disease in patients showing clinical remission, or for monitoring response to therapy. Our Unit also provides support to CNIO’s Clinical Research Units and Research Groups by developing and implementing novel solutions for their research needs. Involved in the global efforts to standardise and improve molecular diagnostics testing in cancer, we work in partnership with international and national consortia dedicated to these objectives. Finally, our Unit remains fully committed to promoting laboratory training and mentoring for students, technicians, and medical residents.

Despite the fact that the COVID-19 pandemic notably disrupted the testing status quo in the area of oncology diagnosis, MDU not only continued to supply our NHS hospitals with assays but also established new ones.

**Broadening our genetic testing catalogue**

During 2020, we implemented 3 new molecular diagnostic tests based on bi-directional Sanger sequencing. These tests will allow us to provide more comprehensive molecular diagnostics of some haematological malignancies like myeloproliferative neoplasms (MPN), myelodysplastic syndromes (MDS), chronic myelomonocytic leukaemia (CMML) and acute myeloid leukaemia (AML), for which we were already offering a sizable panel of clinically applicable markers (FIGURE).

The first 2 assays aim to detect mutations in the ASXL1 (additional sex combs-like 1) gene that plays a role in both embryonic development and chromatin remodelling, and in the SF3B1 (splicing factor 3b subunit 1) gene, which encodes a catalytic core component of the RNA splicing machinery and is involved in transcription and mRNA processing. Somatic mutations in ASXL1 and SF3B1 genes have been observed, among many other cancers, mostly in MDS, CMML, and AML. Mutually exclusive, ASXL1 mutations are prognostic of high-risk MDSs, acute transformation in CMML, and shorter overall survival of patients with AML, while SF3B1 structural alterations are predictive of a longer overall survival of MDS patients but shorter overall survival in de novo AML and chronic lymphocytic leukaemia (CLL) patients.

The third test developed seeks to detect mutations in the SETBP1 (SET-binding protein 1) oncogene, encoding a binding partner for the multi-function SET oncoprotein involved in apoptosis, transcription and nucleosome assembly. SETBP1 overexpression is associated with a worse overall survival of elderly AML patients. Furthermore, somatic gain of function mutations of SETBP1 are associated with myeloid leukemic transformation and convey poor prognosis of MDS and CMML patients.

**Tutoring**

In 2020 we hosted, in the framework of our training policy, one medical resident.