Using the hPSC Genetic Analysis Kit

Human pluripotent stem cells (hPSCs), including embryonic and induced pluripotent stem cells, acquire recurrent genetic abnormalities during prolonged culture (1-3). These karyotypic abnormalities can alter the behavior of stem cells, jeopardizing the validity of a disease model, drug screen, or cell therapy. The hPSC Genetic Analysis Kit contains all required components to detect over 70% of the most common karyotypic abnormalities reported in hPSC cultures. This qPCR-based kit detects the copy number of the minimal critical regions of commonly mutated genetic loci with high specificity and sensitivity through the use of double-quenched probes. It is designed to address an unmet need in the field and empowers researchers to confirm stem cell culture quality and have confidence in their data.

Why Use the hPSC Genetic Analysis Kit?

TARGETED. Designed to detect the majority of karyotypic abnormalities observed in hPSC cultures.

RAPID. From cells in culture to results within one day.

COST-EFFECTIVE. Low cost per sample enables more frequent screening of multiple samples.

CONVENIENT. Online hPSC Genetic Analysis Tool for streamlined data analysis and interpretation.

Figure 1. The hPSC Genetic Analysis Kit Identifies Chromosome 12 Trisomy

Chromosome 12 trisomy in WLS-1C human iPS cell line is (A) detected using the hPSC Genetic Analysis Kit (orange bar: \( p < 0.05 \)) and (B) confirmed by G-banding.

Figure 2. The hPSC Genetic Analysis Kit Identifies Chromosome 1 Duplication via Unbalanced Translocation

Unbalanced rearrangement of chromosome 1 in the WLS-1C human iPS cell line in which an extra copy of the long (q) arm of chromosome 1 translocated to the short arm (p) of chromosome 21 was (A) detected using the hPSC Genetic Analysis Kit (orange bar: \( p < 0.05 \)) and (B) confirmed by G-banding.

Figure 3. The hPSC Genetic Analysis Kit Identifies Chromosome 20q11.21 Duplication

Chromosome 20q duplication in WLS-4D1 human iPS cell line is (A) detected using the hPSC Genetic Analysis Kit (orange bar: \( p < 0.05 \)), (B) undetected by G-banding, and (C) confirmed by fluorescent in situ hybridization using probes for 20p11 (green) and 20q11.21 (red).

Detection of a Sub-Karyotypic Recurrent Abnormality with the hPSC Genetic Analysis Kit

Amplification of chromosome 20q11.21 is a sub-karyotypic abnormality, and thus is often undetected by traditional karyotyping methods (G-banding). Chromosome 20q11.21 gain results in increased copy number of several genes, including BCL-XL, which confers a strong selective growth advantage to hPSCs (4, 5).
Are Your Pluripotent Stem Cells What You Think They Are?

Recurrent abnormalities may provide a selective advantage to hPSCs in culture through enhanced cell proliferation and survival, or reduced spontaneous differentiation. Cells harboring genetic abnormalities can therefore rapidly overtake genetically stable cells in culture (Figure 4) and significantly impact research conclusions (6), highlighting the need for frequent monitoring of hPSC genomic stability.

References


The hPSC Genetic Analysis Kit is designed for use in the Maintenance stage of the hPSC Research workflow.

Reprogramming  Maintenance  Differentiation