

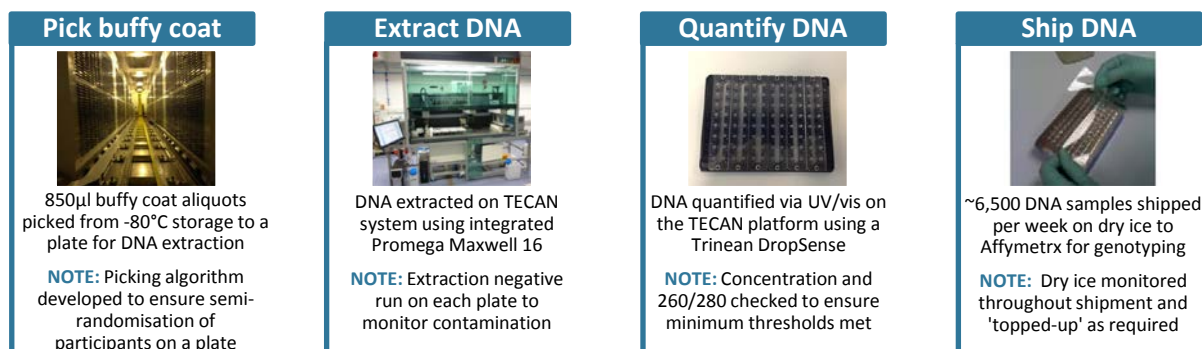
During the initial recruitment of participants (2007-2010), samples were collected that could yield DNA. DNA extraction was deferred until such a time that a project required DNA and it was anticipated that the cost of extraction would be reduced.

In early 2013, DNA extraction begun on buffy coat samples and genotyping was performed on a custom Affymetrix Axiom array¹.

Overview of process

DNA is extracted from 850 μ l buffy coat (recovered from 9 ml of whole blood) on a customised TECAN Freedom EVO[®] 200 platform. The system incorporates peripheral equipment to provide a fully integrated DNA extraction solution;

- 2 x Promega Maxwell[®] 16 Instruments for DNA extraction
- 1 x Trinean DropSense[®] 96 for DNA quantification
- 1 x Brooks Tube Auditor[™] for volume measurement
- 1 x Liconic STX44 Automated Incubator to ensure DNA is kept at correct temperature after extraction



DNA Extraction Chemistry

UK Biobank uses a customised version of the Promega Maxwell[®] 16 Blood DNA Purification Kit (AS1010), which uses magnetic bead technology to purify the DNA. The kit and protocol have been modified to optimise the DNA yield from a larger than typical volume of buffy coat (850 μ l); this includes additional lysis and wash buffer and an additional pass through the extraction process. DNA concentration and quality (assessed via 260/280) is assessed in each sample. The average DNA concentration is for is 37 ng/ μ l and 260/280 is 1.91 for ~275,000 DNA samples.

Quality Control

Several quality control checks are performed at UK Biobank to ensure the DNA extracted is of good quality;

- DNA concentration check – plates automatically pass extraction if >80% of the samples have a concentration >10 ng/ μ l
- DNA purity check – plates automatically pass extraction if >80% of the samples have a 260/280 between 1.8 and 2.2
- Inclusion of an extraction negatives on each plate
- Inclusion of blind spiked duplicate samples

DNA for future projects

50 μ l of DNA is being utilised in the UK Biobank Genotyping project. The remaining DNA is split into two 425 μ l aliquots and stored at UK Biobank for use in future projects. In addition to the DNA concentration and 260/280 recorded for each aliquot, the concentration obtained via PicoGreen at Affymetrix is recorded. The DNA concentration is used to ensure enough DNA can be provided for future projects.

¹ Detail on the Axiom array available from <http://www.ukbiobank.ac.uk/scientists-3/uk-biobank-axiom-array/>