SUReYield DNA Collection Kit, a high yield, infant compatible kit, to be used in the development of medical, diagnostic and research devices.

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Introduction

The use of genetic tests has become a necessary tool for the diagnosis of conditions and diseases affecting the health of thousands of people [1,2]. Traditionally, genetic material for these studies has been collected from blood samples, an invasive and expensive procedure that requires a trained professional to perform the blood sampling, which in turn must be properly kept in cold storage conditions [2,3]. These disadvantages make blood sampling a complicated and expensive method to collect DNA.

On the other hand, our buccal swab collection kit allows clinical or research laboratories to obtain high-quality genetic material, ready to be used in molecular diagnostics. Our kit features:

- Non-invasive sampling method that does not require a health-care professional to be involved.
- Use of materials with the best DNA collection indices [4,5,6].
- An instructional video, to help make your sampling procedure easier and more efficient than simply following written instructions.
- A proprietary solution that ensures stable DNA at room temperature for over 60 days.

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Electronic supplementary material
The online version of this article (www.genosur.com/sureyield-dna/technical-note) contains supplementary material.

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Materials and methods

Quality and quantity assessment of DNA extraction

Swab collected buccal samples were obtained from 80 donors, with the scope of this study properly explained to each of the subjects, as well as any possible risks. None of these donors had performed any buccal swab collection procedures before; they followed detailed instructions, either print-based (n=40) or video-based (n=40) (see Supplementary Information P1 and V1). DNA extraction from the samples was performed with the QIAGEN DNA mini kit, processing 200 µl aliquots of each sample. Quantitation of extracted DNA was performed with a Biotek EPOCH spectrophotometer, using a Take3 plate. Purity of extracted DNA was determined from the ratio of the absorbance at 260 nm and 280 nm. Quality of extracted DNA was verified loading 180 ng of extracted DNA into a 0.8% agarose gel stained with SYBR Safe DNA stain (Invitrogen). The length of the extracted DNA were determined by comparison with the Lambda HindIII ladder (New England BioLabs).

For the infants group, buccal swab samples were collected from 5 donors aged between 3 months to 5 years, and their legal guardians followed the video instructions.

Stability of the sample in the stabilizing solution

Buccal samples were obtained from another 5 donors and placed in our proprietary stabilization solution. Stabilized samples were divided into 4 aliquots of the same volume, and were processed and quantitated at different time intervals (1, 30, 45 and 60 days).

Results

After extraction, the group following the instructional video obtained an average of 6.2 µg DNA (n=40), with over 95% of them obtaining over 1.8 µg DNA (Fig. 1, Table 1). DNA extraction yield was compared between both groups, and the difference was statistically significant. (Unpaired t-test, p<0.001).

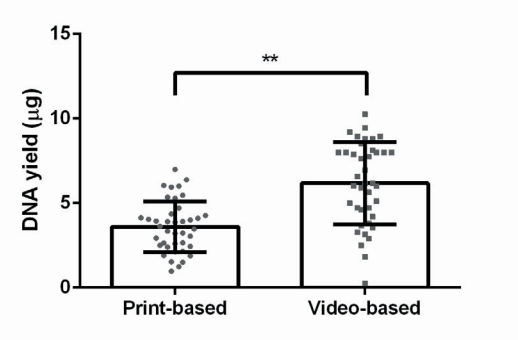

Figure 1. Effect of instructional material on DNA yield. Donors using the video-based instructional material had a better performance against the donors using the print-based instructional material (n=40, unpaired t-test, p<0.001).

	Print-based instructions	Video-based instructions
Average (µg)	3.6	6.2
Median (µg)	3.5	6.2
Minimum (µg)	1.0	0.3
Maximum (µg)	7.0	10.2
5th percentile (µg)	1.3	1.9

Table 1. Effect of instructional material on DNA yield.

We've compared our data to that reported by another company [7] and have found that our device is more efficient, yielding 50% more DNA (Fig. 1).

Similar results were obtained with the infant donors, collecting an average of 6.5 µg DNA (n=5) (Table 2). Legal guardians agreed that SUReYield DNA collection kit is both safe and easy to use, thus completing the buccal sampling without complications.

	Infant donors
Average (µg)	6.5
Median (µg)	5.7
Minimum (µg)	2.8
Maximum (µg)	12.3

Table 2. DNA yield of samples collected from infants. No significant difference was found when this dataset was compared to the one obtained from the adult group, thus validating SUReYield as an efficient infant DNA collection device.

The DNA sample stability study demonstrated that samples stored in the SUReYield proprietary solution for over 60 days at room temperature, showed no statistically significant variation on DNA yield, across the analyzed time points (1-way ANOVA, followed by Tukey's post hoc test, p=0.3) (Fig. 2).

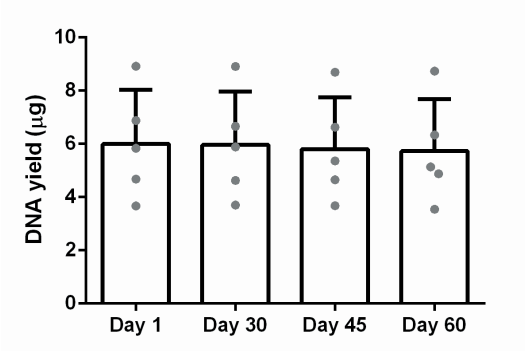

Figure 2. DNA stability in proprietary stabilization solution over time. The samples obtained with SUReYield DNA collection kits are stable at room temperature up to 60 days without degradation (1-way ANOVA, followed by Tukey's post hoc test, p=0.3).

Finally, when evaluating the DNA integrity obtained through a 0.8% agarose gel, results showed that most of the genetic material is over 20 kb in length, with no significant degradation.

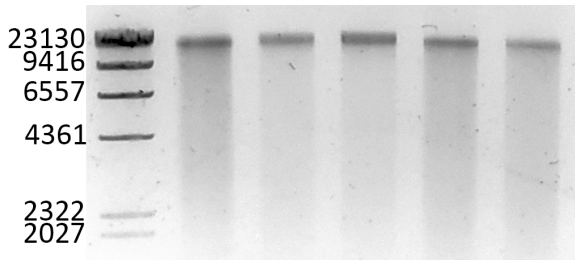

Figure 3. DNA integrity. Agarose electrophoresis showed that SUReYield samples have over 20 kb in length with no significant degradation.

Conclusions

SUReYield DNA Collection Kit allows for effective buccal sample collection and DNA stabilization. We have shown that when this device is used with infants, the DNA yield is equivalent to that obtained from adults. Therefore this device can be used in the development of research and clinical sampling kits for all ages and the quality and quantity of the DNA obtained is compatible with the most popular downstream molecular diagnostics technologies.

References

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