



## Changing a Paradigm: Non-Invasive Sampling as a Case Study

### The Emergence of a Universal Non-invasive Sample Collection System

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“The secret of change is to focus all of your energy, not on fighting the old, but on building the new.”  
— [Socrates](#)

Changing a paradigm is often challenging, especially when it has been established for a long period of time. The process of non-invasive biological sample collection is good example.

The use of swabs to collect buccal cells is one of the oldest methods of non-invasive sample collection for DNA analysis. The longevity of this technique is a testament to its simplicity and universal acceptance in multiple industries and scientific disciplines as a viable alternative to more invasive methods such as blood draw or tissue biopsy.

Despite its advantages and widespread adoption, traditional swab-based methods for sample collection have several shortcomings that present a number of risks:

1. Swabs often yield insufficient quantities of DNA for proper analysis, resulting in the need for resampling. The compliance rate for resampling is already low for clinical purposes, but it is essentially zero for high-value samples such as forensic evidence or rare and exotic wildlife collected in the field.
2. The mouth contains a significant amount of bacteria, which can hitch a ride on the swab and even multiply if the swab has to endure extended transportation time. Bacterial contamination can reduce overall DNA quality and affect the results of costly downstream assays such as Next Generation Sequencing
3. Processing swabs in the lab can be a time consuming and labor intensive task because the swab itself needs to be

digested before the DNA is analyzed. This is a particularly difficult challenge for high throughput labs that use automation robots. The cumulative effect of additional processing time over hundreds or thousands of samples per day leads to reduced capacity and escalating costs.

4. Long term storage of swabs requires expensive infrastructure including refrigeration or controlled humidity environments. This adds to the operational inefficiency which ultimately eats into the bottom line.

The team at Mawi DNA Technologies decided to challenge the paradigm by transforming a well-established but inefficient sample collection method into one that leverages the ease and convenience of swab collection but with none of the disadvantages.

Our innovation does not stop at resolving the drawbacks of traditional buccal swab collection but also blood collection. Our product is able to achieve similar levels of DNA yield and quality, with minimal bacterial content. However, unlike blood our product is non-invasive and has no refrigeration requirements for either transportation or long-term storage.

One of the main advantages of swab-based collection retained in our product is the ability of either self or assisted collection across all population groups including infants, elderly, and mentally or physically compromised patients. This functionality makes our [iSWAB a universal non-invasive sample collection system](#). Thus allows for better understanding of population genomics leading to more information that can help advance personalized medicine and population genetics.

The basis of Mawi's technology extends into other applications as well, such as collection and stabilization of microbiome and blood samples including RNA and proteins from humans or animals. Other exciting products in development will enable room temperature stabilization of intact, non-lysed blood and cell samples which have the potential to significantly reduce cold chain transport costs for researchers and advance **OMICS research**.

We welcome any [requests](#) to evaluate our new non-invasive sample collection technology as well as discussions around possible collaborations.