



Finding *Fast & Reliable* **DNA & RNA Processing**

**A Guide to Outsourcing Nucleic
Acid Extraction**



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Introduction: The Problem with Outsourcing Nucleic Acid Extraction to Traditional Core Lab Services

Nucleic acid extraction is a critical first step for applications like PCR (polymerase chain reaction), RT-PCR (reverse transcription PCR), qPCR (quantitative PCR), DNA sequencing and many other molecular biology techniques. However, many labs lack the equipment to extract high-quality nucleic acid at scale, so they turn to an outsourced lab services provider.

When it comes to finding nucleic acid extraction services, your options boil down to two buckets – core labs and specialist providers

While many scientists will choose the core lab, it's important to know that core labs have many shortcomings that can affect the outcomes of your nucleic acid extraction project.

Core labs are large organizations—usually university labs, large sample collectors, life science companies and other contract research organizations. They have access to extensive lab space, equipment, and protocols for DNA and RNA extraction, as well as many other common processes and techniques.

While that may sound great, **all the lab space and instrumentation won't matter if they can't meet your timelines.**

Core lab service models are not equipped for tight turnarounds and customized services. Their services are offered at scale. This leaves little room for protocol customization, fast turnarounds and person-to-person communication, should you need it. As a result, your extraction quality may suffer.

If you're a prospective Ph.D. student compiling your dissertation, or working in drug development on tight deadlines, or researching the precise, time-sensitive progression of disease—this slowdown in laboratory processing means **your research could be compromised and your funding window could run out.**

So, what happens when you don't have months to wait on a traditional core lab to extract usable nucleic acid from your samples?

This guide will give you the answer.

In it, we will cover the consequences of long project timelines for nucleic acid extraction. Then, we will dive deeper into extraction specialists – and why working with a different type of lab services provider matters.



How Long Project Timelines Affect DNA/RNA Extraction

Core lab services are always in demand because they provide so many services. That demand leads to scheduling issues, which, in turn, lead to longer timelines for your nucleic extraction project. Longer extraction timelines lead to outcomes that severely impact your research.

Consideration #1 The Nucleic Acid Quality Suffers

A sample sitting on a shelf will degrade. Of course, most labs will have cold storage solutions that will delay the effects of sample degradation, but they're not foolproof.

Blood, for example, can last a week on a shelf at room temperature before concerns about the quality of DNA start to arise. Some labs store samples in an Ultra-Low Freezer at -80C. At this temperature, all metabolic activity stops. The problem is that storing at that temperature is expensive.

Other labs will store their samples at -20C, but this temperature also leads to challenges. Samples can degrade relatively quickly, even though they're in the freezer. Plus, clotting can occur because metabolic activity does not stop at -20C.

If you're extracting RNA from an EDTA tube, it must be done in less than three days. After that, the results tend to be unusable. To make things more complicated, you can't freeze these samples. They must be handled right away. RNA extracted within several hours should be kept on ice, preferably with an aluminum block. If needed to be stored overnight, it can be frozen at -20C. For long-term storage, it needs to be stored at -80C. Frozen samples should be thawed on ice and thoroughly mixed before extracting.

The point is that even in cold storage, many samples can degrade, and others need to be processed right away. Both of these are challenges for many laboratories.

Extracting high-quality nucleic acid is a critical step in many downstream applications. That degraded quality can then affect the outcome of the downstream, or even worse, the nucleic acid could be completely unusable in the study, which leads to the next consideration.

Consideration #2 Re-collecting Samples

If you're unable to extract high-quality DNA or RNA from your original run of samples, then you'll have to collect them again.

While that sounds simple on paper, as a researcher, you probably know just how logistically challenging it will be for your research timelines and your study population.

While there are options out there for collecting and extracting pure, genomic DNA from saliva, many of the best sample types require a finger prick, blood draw or an even more invasive procedure like bone marrow collection. In many populations, doing an invasive sample collection again only adds undue stress to the patient.

In many cases, re-collecting samples is impossible. When studying the progression of disease in a specific population, collecting another sample would be pointless because their disease may have progressed past the stage you are studying. If you're studying a rare disease, there may not be enough people for you to get samples from. Also, members of the original study population may be hard to track down. They may have moved or, unfortunately, passed away. This means you will have to go through the trouble of finding a new population.

Re-collecting samples, tracking down a new study population and sending the new samples off to be processed takes even more time – time you may not have.

Which leads to the last and most important consequence.

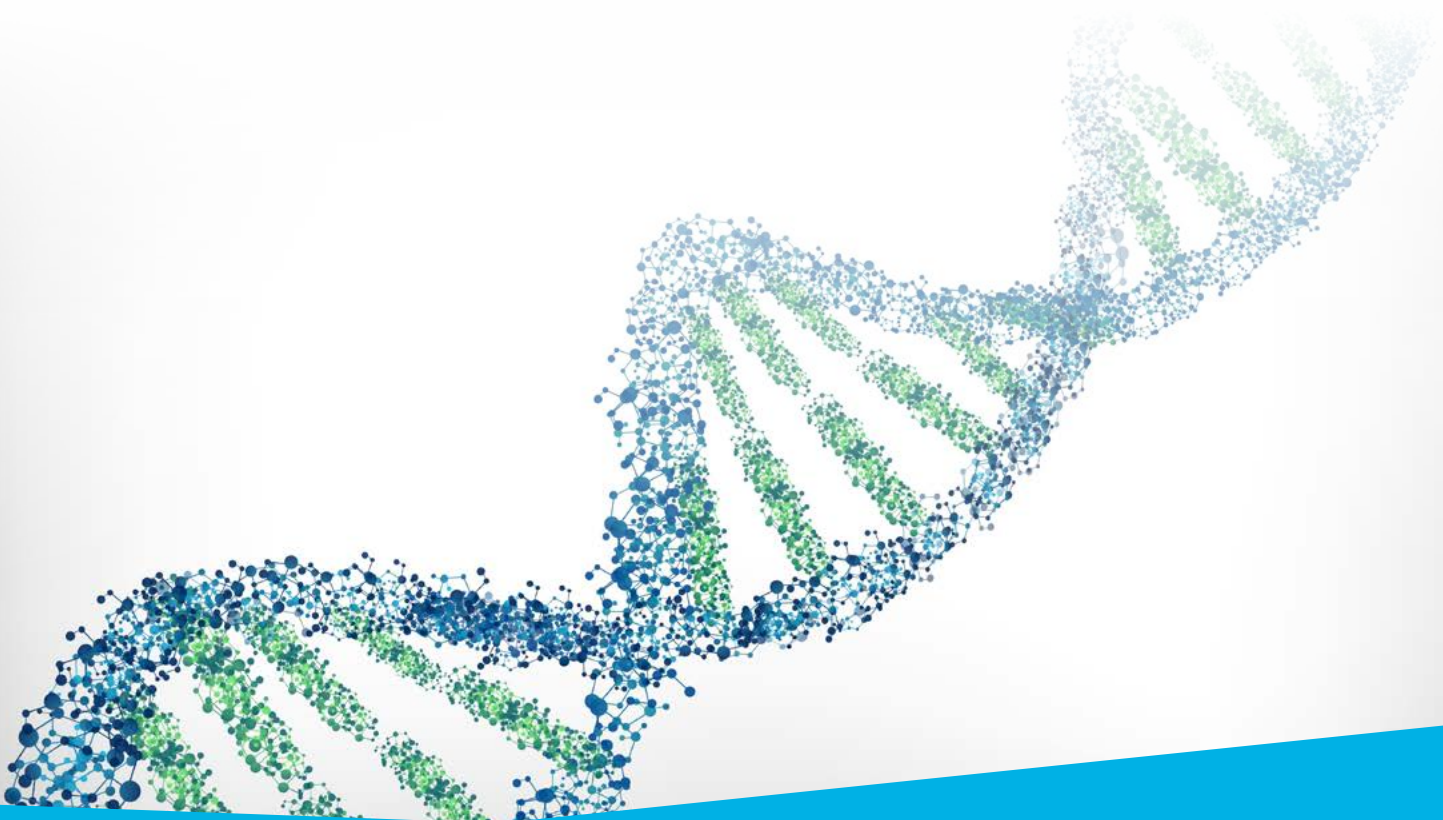
Consideration #3 Running Out of Funding

Drug development follows strict timelines, and Ph.D. research comes with limited funding over a specified time period (usually 20 quarters or 5 years).

This means you're working against the clock. A major delay in getting high-quality nucleic acid for your research means potentially running out of funding.

These consequences have one big chain reaction: your research doesn't get done, and the lives you hope to impact don't see a new therapy.

To avoid these outcomes, you need a specialist nucleic acid extraction provider. Let's look at what sets boutique nucleic acid extraction specialists apart from core labs.



Processing Samples with a Nucleic Acid Extraction Specialist

An Overview of How It Works and What to Look for in a Provider.

Working with a boutique nucleic acid extraction services provider is the easiest and most reliable option for overcoming tight timelines and service challenges. They can provide the expertise needed to extract the highest-quality DNA or RNA from your samples on a timeline that fits your research.

But before we dig in further, let's answer the question...

What is a Boutique Nucleic Acid Extraction Provider?

Nucleic acid extraction specialists are smaller organizations specializing only in nucleic acid extractions. They provide products like instrumentation, sample collectors, consumable kits and storage tubes. Plus, they can do it all with a level of service that can handle any extraction need on faster timelines than the generalists.

Let's see how.

Nucleic Acid Extraction with a Boutique Provider

Step #1: Sending Your Samples

The first step when working with any sample extraction is sending your samples to your partner.

The key here is to make sure no expense is spared shipping and storage. Premium shipping and handling and cold storage capabilities are a must. Usually, when you onboard a provider, they will send you the packaging and instructions you will need to effectively ship your samples in to be processed.

When looking for the right provider, dig into their shipping process. Make sure they're using proper packaging and cold-storage protocols once your samples arrive. They should also be able to provide a way to track your samples (like an RFID device or AirTag included in the packaging) at every step of their journey.

Package tracking from FedEx or UPS doesn't always work, and it's vital to have that extra layer of tracking insurance to ensure your samples don't get lost.



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Step #2: Configuring the Right Workflow

Not all DNA and RNA extractions are identical.

That's why when you work with a specialist extraction provider, they should be in constant contact to configure the right workflow and instrumentation to yield the most amount of usable nucleic acid.

The workflow you choose will depend on a variety of factors, including:

- + Your downstream needs and the needs of your research
- + Throughput needs - depending on the timeline and the number of samples
- + The type of sample
- + How much DNA or RNA is needed from each one
- + The type of workflow needed

Vet potential providers based on the workflows they can offer and the instrumentation types they have in their lab. Having a variety of instruments will ensure they are able to build the workflow that is best for your sample type. There are three main extraction workflow types.

- 1. Magnetic Bead-Based Isolation** - This type of workflow creates fast, high-yield nucleic acid purification from virtually all molecular diagnostic, biological, clinical, and forensic sample types. It's extremely flexible, offering protocols for DNA and RNA isolation from solid tissues like FFPE to liquid-based or cell-line samples.
- 2. Membrane-Based Isolation** - This type of workflow uses an ultra-thin, polymer, porous membrane along with gentle, positive air pressure to provide a quick, high-purity, high-yield nucleic acid extraction. With this process, the nucleic acid is isolated at low pressure without damage.
- 3. Precipitation-Based Isolation** - This unique workflow is an automated solution for genomic DNA extraction and isolation from large volumes of blood, saliva, buffy coats, and more. The FlexSTAR+ extraction instrument is the first and only totally automated system utilizing Qiagen's FlexiGene chemistry to isolate genomic DNA free of RNA and other contaminants.

Based on all these factors, the provider you choose should give you a dedicated point of contact who works with you to craft the workflow you need for the best result.

Step #3: Sample Processing

Once the samples arrive and the workflow has been configured, it's time to start processing your samples.

Dedicated lab professionals will run the samples through the instruments that will yield the best results for your sample type and needs, monitoring at every step to ensure quality.



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Step #4: Storage, Organization and Shipping

Once the samples have been processed, the provider will organize them and ship them back to you.

Ensure the vendor you choose has a foolproof process for ensuring all extractions are properly accounted for and traced back to the sample that they came from. An SBS tube and rack system is key here, and it allows for easy organization and scanning to account for all samples in your inventory.

Once the samples are organized in their racks, they will be packaged up, tagged with a tracking device and shipped back to your lab.

Bonus Step:

Should you choose to start extracting DNA or RNA in your lab, find a vendor that has a wide variety of extraction offerings to partner with. Building that partner relationship is key to ensuring that your own instrumentation and processes for collecting DNA and RNA are fully optimized. It's also crucial to ensure you have a consistent supply of tubes and chemistries you need to complete your projects.

Service Matters When Samples Are Critical

At the end of the day, if you want to ensure your samples are processed as quickly as possible while still yielding high-quality nucleic acid for your downstream, consider working with a boutique provider.

Core labs and generalist service providers are primarily focused on meeting large commitments with months-long timelines. This makes it virtually impossible for them to be able to deliver the kind of communication and response times required when it comes to shipping critical samples and scoping out the right workflow to maximize yield.

Smaller, more specialized providers offer a completely different experience. When you work with an extraction specialist, they can assist you with the entire nucleic acid extraction process. Whether your research requires high-quality and high molecular weight samples or if you're looking to purchase nucleic acid extraction instrumentation for your lab, talking to a nucleic acid extraction specialist is the best way to get your questions answered.


At AutoGen, we take pride in our level of boutique service. Unlike other providers, when you call AutoGen, a person answers. We take your nucleic acid extraction project seriously to make sure every step is tailored to meet the needs of your downstream processes.

About autogen

AutoGen provides expert nucleic acid extraction solutions for high-volume labs, including outsourced processing services, highly customizable automated instruments, and consumable kits. Their solutions help biobanks, universities, CROs, and diagnostics centers increase DNA and RNA processing throughput, meet commitments to end customers, and advance the business of science. A boutique lab itself, AutoGen understands the growing workloads and technical demands of modern labs, and the human-centric level of service needed to respond.

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