

# Storing RNA at Room Temperature

## A Reliable and Smart Laboratory Cost Cutting Approach

Franklin Chin

This application note describes the utility of storing RNA products at room temperature. As a sensitive biomolecule prone to degradation, RNA is normally stored in -80oC freezers and shipped on dry ice. Unfortunately, this significantly increases the laboratory costs of handling RNA and introduces other storage concerns. By having the ability to store RNA at ambient temperature, these limitations may be circumvented for better efficiency and budgets.

### Introduction

RNA is a highly valuable biomolecule in biological research that is used for many applications including gene expression assays and RNA-seq. As a nucleic acid, however, RNA is much more sensitive to degradation than DNA and must be stored at more restrictive temperatures (e.g. -80°C freezers). This leads to increased costs for equipment and electricity, and there is always the risk of a power outage that would compromise sample integrity.

In addition, shipping fees may become prohibitive as RNA is generally packaged on dry ice. This could potentially lead to transport fees becoming even greater than the cost of the RNA itself when shipping internationally.

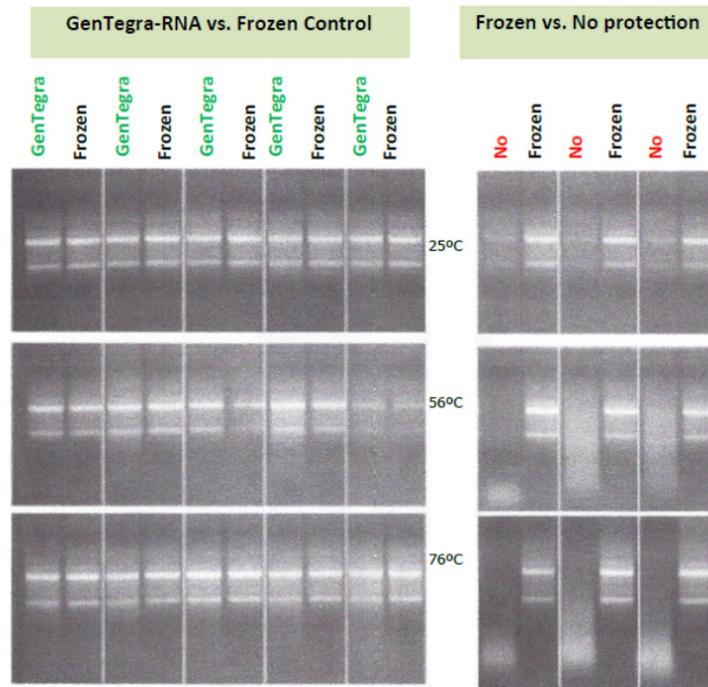
To circumvent these expensive storage and shipping costs, a novel product from GenTegra™ containing an inert chemical matrix is used to stabilize RNA at room temperature conditions. Packaged in this format, the shelf-life of RNA can be extended to at least 3 years when stored at ambient temperature. The tubes containing the stabilized RNA can then be dropped into an envelope for shipping around the world, thus greatly alleviating freight costs.

### Case Study: GenTegra™

Here the manufacturer presented a study demonstrating the integrity of PAXgene RNA when stored at three different temperatures (25°C, 56°C, and 76°C) with or without chemical stabilization for 30 days (Figure 1). The results clearly show that the RNA quality is only maintained at all temperatures if their GenTegra™-RNA product is used.

### Case Study: Martinez et. al, 2018.

Here the authors presented a study where total RNA extracted from the T84 cell line was stored at different temperatures (25°C, 37°C, and 56°C) for a period of two weeks. As a comparison, aliquots of RNA were dried using GenTegra's stabilization technology and subjected to the same storage conditions. A BioAnalyzer run was performed at the end of the two-week period and the RIN of each sample was compared. The findings demonstrate that there is minimal to no degradation of the RNA at each storage temperature when it is stabilized with GenTegra's product (Table 1).



**Figure 1.** The integrity of PAXgene RNA with or without chemical stabilization was examined under three different storage temperatures. First, RNA from PAXgene tubes was purified and split into aliquots. These were then stored either frozen at  $-80^{\circ}\text{C}$  or at the indicated temperatures with (GenTegra<sup>TM</sup>-RNA) or without (No) chemical protection. Finally, a gel was run after 30 days of storage to compare the RNA quality. In all cases, the RNA was preserved only when using chemical protection. (GenTegra – <https://gentegra.com>)

Storage Temperature	Condition	RIN
25°C	GenTegra <sup>TM</sup> RNA	9.50
	No Protection	8.00
37°C	GenTegra <sup>TM</sup> RNA	9.70
	No Protection	5.90
56°C	GenTegra <sup>TM</sup> RNA	8.90
	No Protection	2.10
-70°C	Frozen Control	9.70

**Table 1.** RNA from the T84 cell line was stored at the indicated storage temperatures for two weeks in the presence or absence of GenTegra’s RNA-protecting stabilizer. The RIN values of these samples were then obtained and compared to a frozen control. The data indicate that there is minimal to no degradation but only if there is chemical protection. (Martinez et al., 2018)

## Conclusions

There are many important advantages to storing RNA at room temperature. These include freedom from requiring freezer space and a significant reduction in electrical and shipping costs (Table 2). In this application note, we highlighted the utility of GenTegra™-RNA in the achievement of this goal.

BioChain Institute, Inc. currently has a vast inventory of ready-to-ship total RNA products that are purchased by customers from all over the world. Many of them have already adapted to the new ambient temperature format to save on expensive dry ice shipping costs. To begin relieving yourself from the burdens of frozen RNA storage, please visit our website at <https://www.biochain.com> and ask us how you can also make the switch today.

	Storage in Freezers	Storage at Room Temperature
Freezers Needed	Yes	No
Freezer Costs	\$\$\$	No
Freezer Maintenance	Yes	No
Other Storage Issues	Freezer Malfunction Electrical Blackout Potential for Freezer Burns	Worry-Free Storage
Shipping Costs	\$\$\$	\$

**Table 2.** This table compares the storage and shipping issues to keep in mind when considering whether to keep RNA in the traditional frozen format or switch to room temperature.

## References

- Martinez, H., Beaudry, G., Veer, J., Robitaille, M., Wong, D., Iverson, B., and Nunez, R. 2018. *BioTechniques*, 48(4): 328
- Wang, Z., Gerstein, M., and Snyder, M. 2009. *Nat. Rev. Genet.*, 10(1): 57
- GenTegra LLC. <https://gentegra.com>



**BioChain Institute, Inc.**  
39600 Eureka Drive  
Newark, California, USA 94560

**Phone:** 1 (888) 762 2568  
**Fax:** 1 (510) 783 5386  
**[www.biochain.com](http://www.biochain.com)**