PEPTIDE RECONSTITUTION & STORAGE

QUICK REFERENCE GUIDE

A Practical Guide to Dilution Calculations, Handling Protocols, and Stability Considerations for Peptides

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SECTION 1

Understanding Reconstitution

What Is Reconstitution?

Most research peptides are supplied in **lyophilized (freeze-dried) powder form**. Lyophilization removes water under low temperature and pressure, creating a stable powder that preserves molecular structure during transport and storage.

Before use the peptide must be **reconstituted,** meaning a sterile diluent is added to return it to liquid form suitable for measurement and application.

Why Accuracy Matters

Reconstitution directly determines the quality and reliability of your research outcomes:

- **Final concentration (mg/mL)** — determines how much peptide is in each measured volume
- **Measurement precision** — small errors compound across multiple measurements
- **Reproducibility** — consistent reconstitution enables repeatable research protocols
- **Stability after mixing** — proper dilution affects how long the peptide remains viable

This guide is designed to make reconstitution simple, accurate, and repeatable.

The Reconstitution Process at a Glance

Step	Action	Notes
1	Gather materials	Peptide vial, diluent, syringe, alcohol swabs
2	Calculate target concentration	Use the formula: mg ÷ mL = mg/mL
3	Draw diluent into syringe	Measure volume precisely
4	Inject diluent into vial	Aim at glass wall, not directly at powder
5	Swirl gently to mix	Never shake vigorously
6	Label and store	Date, concentration, storage condition

SECTION 2

Reconstitution Fundamentals & Key Terms

Key Terminology

Term	Definition
Milligram (mg)	A unit of mass. Most peptide vials are labeled in milligrams (e.g., 5mg, 10mg).
Microgram (mcg)	1/1,000th of a milligram. 1mg = 1,000mcg. Many protocols specify amounts in mcg.
Milliliter (mL)	A unit of liquid volume used to measure diluent added and resulting solution.
Concentration (mg/mL)	The amount of peptide dissolved per milliliter of solution after reconstitution.
Lyophilized	Freeze-dried — the stable powder form in which most research peptides are shipped.
Diluent	The sterile liquid used to reconstitute a lyophilized peptide.
Reconstitution	Adding sterile diluent to lyophilized powder to return it to liquid form.

Common Diluent Options

Diluent	Description	Best Used When
Bacteriostatic Water (BWFI)	0.9% benzyl alcohol; inhibits bacterial growth.	Multi-use vials; extended storage.
Sterile Water for Injection (SWFI)	Preservative-free; no bacterial inhibition.	Immediate / single-use only.
0.9% Sodium Chloride (Saline)	Isotonic sterile solution.	Protocols requiring isotonic diluent.
Acetic Acid (0.1–1%)	Acidic solution for low-pH peptides.	Peptides requiring acidic conditions.

The Core Reconstitution Formula

Total mg in Vial ÷ Total mL of Diluent Added = mg per mL

Example: 10mg vial + 2mL diluent → 10 ÷ 2 = **5mg/mL** (0.5mL = 2.5mg — 0.1mL = 0.5mg = 500mcg)

SECTION 3

5mg Vial Reconstitution Tables

Common 5mg Reconstitution Scenarios

Vial Size	Diluent Added	Final Concentration	mcg per mL
5 mg	0.5 mL	10 mg/mL	10,000 mcg/mL
5 mg	1 mL	5 mg/mL	5,000 mcg/mL
5 mg	2 mL	2.5 mg/mL	2,500 mcg/mL
5 mg	3 mL	1.67 mg/mL	1,670 mcg/mL
5 mg	5 mL	1 mg/mL	1,000 mcg/mL
5 mg	10 mL	0.5 mg/mL	500 mcg/mL

Volume Required by Target Dose

Based on: 5mg vial + 2mL diluent = 2.5 mg/mL (2,500 mcg/mL)

Target Amount	Volume to Draw	U-100 Syringe Units
100 mcg	0.04 mL	4 units
250 mcg	0.10 mL	10 units
500 mcg	0.20 mL	20 units
750 mcg	0.30 mL	30 units
1,000 mcg (1 mg)	0.40 mL	40 units
1,250 mcg	0.50 mL	50 units
2,500 mcg (2.5 mg)	1.00 mL	100 units

Tip: The most common reconstitution for a 5mg vial is 1mL or 2mL. Adding 2mL gives a clean 2.5 mg/mL (2,500 mcg/mL) — easy to work with for common microgram-range protocols.

SECTION 4

10mg Vial Reconstitution Tables

Common 10mg Reconstitution Scenarios

Vial Size	Diluent Added	Final Concentration	mcg per mL
10 mg	1 mL	10 mg/mL	10,000 mcg/mL
10 mg	2 mL	5 mg/mL	5,000 mcg/mL
10 mg	4 mL	2.5 mg/mL	2,500 mcg/mL
10 mg	5 mL	2 mg/mL	2,000 mcg/mL
10 mg	10 mL	1 mg/mL	1,000 mcg/mL
10 mg	20 mL	0.5 mg/mL	500 mcg/mL

Volume Required by Target Dose

Based on: 10mg vial + 2mL diluent = 5 mg/mL (5,000 mcg/mL)

Target Amount	Volume to Draw	U-100 Syringe Units
100 mcg	0.02 mL	2 units
250 mcg	0.05 mL	5 units
500 mcg	0.10 mL	10 units
750 mcg	0.15 mL	15 units
1,000 mcg (1 mg)	0.20 mL	20 units
2,000 mcg (2 mg)	0.40 mL	40 units
5,000 mcg (5 mg)	1.00 mL	100 units

Tip: A 10mg vial reconstituted with 2mL gives 5mg/mL (5,000 mcg/mL). This is popular for higher-mass protocols — volumes stay small and measurable with a standard U-100 syringe.

SECTION 5

Microgram Conversion Examples

The mg-to-mcg Relationship

Many research protocols specify amounts in **micrograms (mcg)**. Understanding this conversion is essential for accurate measurement.

1 mg = 1,000 mcg | 1 mcg = 0.001 mg

Conversion Formula

Volume (mL) = Target mcg ÷ Concentration (mcg/mL)

Example A — Concentration 2,500 mcg/mL (5mg vial + 2mL)

Target Amount	Calculation	Volume to Draw
100 mcg	100 ÷ 2,500	0.04 mL
250 mcg	250 ÷ 2,500	0.10 mL
500 mcg	500 ÷ 2,500	0.20 mL
1,000 mcg	1,000 ÷ 2,500	0.40 mL

Example B — Concentration 5,000 mcg/mL (10mg vial + 2mL)

Target Amount	Calculation	Volume to Draw
100 mcg	100 ÷ 5,000	0.02 mL
250 mcg	250 ÷ 5,000	0.05 mL
500 mcg	500 ÷ 5,000	0.10 mL
1,000 mcg	1,000 ÷ 5,000	0.20 mL

Remember: Always convert your target amount to mcg AND your concentration to mcg/mL before dividing. Mixing units (mg vs mcg) is the most common source of calculation errors.

SECTION 6

Insulin Syringe Unit Conversion (U-100)

Understanding the U-100 Insulin Syringe

U-100 insulin syringes are among the most commonly used tools for measuring small volumes. Their fine graduations make them ideal for precise sub-mL measurements.

Specification	Value
Total capacity	1 mL (100 units)
Unit-to-volume	100 units = 1 mL
Each unit equals	0.01 mL
Typical graduation	Every 1 unit (0.01 mL)
Min measurable volume	0.01 mL (1 unit)

mL to Unit Quick Reference

Volume (mL)	U-100 Units	Volume (mL)	U-100 Units
0.01 mL	1 unit	0.30 mL	30 units
0.02 mL	2 units	0.40 mL	40 units
0.05 mL	5 units	0.50 mL	50 units
0.10 mL	10 units	0.60 mL	60 units
0.15 mL	15 units	0.70 mL	70 units
0.20 mL	20 units	0.80 mL	80 units
0.25 mL	25 units	1.00 mL	100 units

Practical End-to-End Example

Scenario: 5mg vial + 2mL bacteriostatic water. Protocol calls for 500mcg.

Step	Calculation	Result
1. Find concentration	5mg ÷ 2mL	2.5 mg/mL = 2,500 mcg/mL
2. Find volume needed	500mcg ÷ 2,500mcg/mL	0.2 mL
3. Convert to syringe units	0.2mL × 100	20 units on U-100 syringe

Result: Draw to the **20-unit line** on your U-100 syringe to measure 500mcg.

SECTION 7

Stability & Storage Reference

Proper storage is critical to maintaining peptide integrity. Stability varies by molecular structure, but the following general principles apply across most lyophilized peptides.

Lyophilized (Unmixed) Storage

Storage Condition	Typical Stability	Notes
Room Temp (15–25°C)	Short-term (transit/handling)	Minimize exposure time
Refrigerated (2–8°C)	Months to 1+ year (varies)	Preferred for routine storage
Frozen (–20°C)	1–2+ years typical	Best for long-term preservation
Frozen (–80°C)	Longest preservation	For extended archival storage

Reconstituted (Liquid) Storage

Storage Condition	Guidance	Notes
Room Temperature	Not recommended	Risk of degradation and contamination
Refrigerated (2–8°C)	Typical: 4–6 weeks	Use BWFI to extend shelf life
Frozen (–20°C)	Months (limit cycles)	Aliquot to avoid freeze/thaw damage

Best Practices for Handling

- **Protect from light** — UV exposure can degrade peptide bonds; store in amber vials or dark conditions
- **Swirl gently, never shake** — vigorous agitation can cause aggregation or denaturation
- **Label every vial** — peptide name, concentration, reconstitution date, diluent used
- **Minimize punctures** — each needle insertion increases contamination risk
- **Use sterile technique** — swab stoppers with 70% isopropyl alcohol before each use
- **Aliquot before freezing** — divide into single-use portions to prevent freeze/thaw cycles

SECTION 8

Common Peptides & Handling Notes

Reconstitution math is identical for all lyophilized peptides, but individual molecules may have unique solubility, pH, and stability considerations.

Peptide	Common Vial Sizes	Recommended Diluent	General Notes
NAD+	500mg, 1g	Bacteriostatic water	Light-sensitive; use promptly after reconstitution
BPC-157	5mg	Bacteriostatic water	Widely studied; tolerates standard storage well
GHK-Cu	50mg, 100mg	Sterile or bacteriostatic water	Copper-peptide complex; avoid metal contact
Selank	5mg	Bacteriostatic water	Intranasal research peptide; refrigerate
SEMAX	5mg	Bacteriostatic water	Light-sensitive; refrigerate after reconstitution
DSIP	2mg, 5mg	Sterile or bacteriostatic water	Handle gently; avoid agitation
VIP	1mg	Bacteriostatic water	Use fresh when possible; refrigerate
Sermorelin	2mg, 6mg	Bacteriostatic water	GHRH analog; refrigerate after reconstitution
TB-500	5mg, 10mg	Bacteriostatic water	Thymosin Beta-4 fragment; standard handling
PT-141	10mg	Bacteriostatic water	Stable under standard conditions
CJC-1295	5mg	Bacteriostatic water	Long-acting GHRH analog; refrigerate
Ipamorelin	5mg	Bacteriostatic water	GHRP; stable; standard reconstitution applies

Always consult molecule-specific literature for each peptide's precise handling requirements.

SECTION 9

Quick-Calculation Worksheet

Use this worksheet each time you reconstitute a new vial.

Field	Your Values	Formula / Notes
Peptide Name	_____	e.g., BPC-157
Vial Size (mg)	_____	Found on vial label
Diluent Volume Added (mL)	_____	Measured amount added
Final Concentration (mg/mL)	_____	Vial mg ÷ Diluent mL
Concentration (mcg/mL)	_____	mg/mL × 1,000
Target Dose (mcg)	_____	From your protocol
Volume to Draw (mL)	_____	Target mcg ÷ Concentration mcg/mL
U-100 Syringe Units	_____	Volume mL × 100
Date Reconstituted	_____	Record for tracking
Estimated Expiry	_____	Based on diluent + storage method

Master Formula Summary

What You Need	Formula
Concentration (mg/mL)	Vial mg ÷ Diluent mL
Concentration (mcg/mL)	mg/mL × 1,000
Volume to draw (mL)	Target mcg ÷ mcg/mL concentration
U-100 syringe units	Volume (mL) × 100
mcg from known volume	Volume (mL) × mcg/mL concentration

SECTION 10

Next Steps & Resources

Simplify Your Calculations

Skip the manual math. CellTek Labs provides a free online Peptide Reconstitution Calculator that instantly computes concentration, microgram conversions, and syringe unit equivalents.

Free Tool	What It Calculates
Peptide Reconstitution Calculator	mg/mL concentration from any vial + diluent combination
	Microgram-to-volume conversion for any target dose
	U-100 insulin syringe unit equivalent for any volume

Visit: CellTekLabs.com/peptide-calculator

About CellTek Labs

CellTek Labs is dedicated to providing high-quality peptide resources, tools, and references for the peptide community. Our mission is to support accurate, reproducible results through education and reliable resources.

Additional Resources

- Online Reconstitution Calculator — CellTekLabs.com/peptide-calculator
- Peptide Storage FAQ — CellTekLabs.com/storage
- Research Blog & Peptide Guides — CellTekLabs.com/blog (COMING SOON)
- Technical Support — support@cellteklabs.com

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