

Reconstitution & Dosing

How to turn a vial of powder into a number you can read on a syringe

A companion document for readers of *The Complete Peptide Protocols Playbook*. The book covers sterile technique — the swabbing, the gauge, the 2–8 °C storage, the labelling. It does not cover the arithmetic. This document is only the arithmetic, and it is the part people get wrong.

Read this first

This document explains a conversion between units of measurement. It is not medical advice, it does not recommend any compound, and it does not suggest that any dose is appropriate for anybody. Many compounds discussed in this field — including BPC-157, TB-500, MOTS-c and retatrutide — are **not approved by any regulator for human use**. What is safe for you is a question for a licensed clinician who knows your history and your medications.

1. The one fact everything rests on

An insulin syringe marked U-100 holds **100 units per millilitre**. That is the entire conversion:

$$1 \text{ unit} = 0.01 \text{ mL} \quad \cdot \quad 100 \text{ units} = 1 \text{ mL}$$

The word “unit” on that barrel originally referred to insulin. It does not mean a unit of your peptide. It is a volume marking and nothing else. Once you accept that, every calculation below is one division.

The idea most people miss

The amount of water you add **does not change how much peptide you take**. A 5 mg vial contains 5 mg whether you dissolve it in 1 mL or 5 mL. Water only changes *how far apart the marks are* — that is, how easy your dose is to measure accurately. More water spreads the same dose over more units. That is the only thing it does.

2. The four formulas

1. **Concentration (mg/mL) = vial mg ÷ water mL**
2. **Volume to draw (mL) = dose mg ÷ concentration**
3. **Units on the syringe = volume mL × 100**
4. **In one line: units = dose(mcg) × water(mL) ÷ (vial(mg) × 10)**

And the two you will want just as often:

5. What one unit delivers (mcg) = $\text{vial(mg)} \times 10 \div \text{water(mL)}$
6. Doses in the vial = $\text{vial(mg)} \times 1000 \div \text{dose(mcg)}$

Worked example, in full

You have a 5 mg vial. You add 2 mL of bacteriostatic water. Your intended dose is 250 mcg.

1. **Concentration.** $5 \text{ mg} \div 2 \text{ mL} = 2.5 \text{ mg/mL}$. In micrograms that is 2500 mcg/mL — the same number, shifted three places.
2. **Volume.** $250 \text{ mcg} \div 2500 \text{ mcg/mL} = 0.1 \text{ mL}$.
3. **Units.** $0.1 \text{ mL} \times 100 = 10 \text{ units}$. Draw to the 10 mark.
4. **Check with formula 4.** $250 \times 2 \div (5 \times 10) = 500 \div 50 = 10$. ✓
5. **One unit delivers.** $5 \times 10 \div 2 = 25 \text{ mcg per unit}$.
6. **Doses in the vial.** $5000 \text{ mcg} \div 250 \text{ mcg} = 20 \text{ doses}$.

3. Choosing your dilution

Because water does not change the dose, you are free to choose it — and you should choose it deliberately, so that your dose lands somewhere you can actually read.

The readability rule

Aim for a dose that falls between roughly **10 and 50 units**. Below about 4 units you are working in the first few graduations, where being one mark out is a very large percentage error. Above 100 units the dose does not fit in a 1 mL barrel at all. U-100 syringes come in 0.3 mL (30-unit), 0.5 mL (50-unit) and 1 mL (100-unit) barrels; the smaller barrels have marks 1 unit apart and are much easier to read.

Water volumes that produce a readable dose

Each row solves formula 4 backwards: given a vial and an intended dose, how much water makes that dose land on a round, comfortable number of units.

VIAL	YOUR DOSE	ADD THIS MUCH WATER	CONCENTRATION	YOUR DOSE THEN READS	DOSES PER VIAL
2 mg	250 mcg	2 mL	1 mg/mL	25 units	8
5 mg	250 mcg	5 mL	1 mg/mL	25 units	20
5 mg	500 mcg	2.5 mL	2 mg/mL	25 units	10
10 mg	250 mcg	4 mL	2.5 mg/mL	10 units	40
10 mg	500 mcg	5 mL	2 mg/mL	25 units	20
10 mg	1000 mcg	2.5 mL	4 mg/mL	25 units	10
15 mg	500 mcg	3 mL	5 mg/mL	10 units	30
15 mg	1000 mcg	3.75 mL	4 mg/mL	25 units	15
20 mg	1000 mcg	5 mL	4 mg/mL	25 units	20

VIAL	YOUR DOSE	ADD THIS MUCH WATER	CONCENTRATION	YOUR DOSE THEN READS	DOSES PER VIAL
30 mg	2500 mcg	3 mL	10 mg/mL	25 units	12

4. The reference tables

Units on a U-100 syringe for every common combination. Shaded amber = readable but tight. Shaded red with X = do not use this dilution for this dose; change the water volume.

VIAL	BAC WATER	MG/ML	1 UNIT =	100 MCG	200 MCG	250 MCG	300 MCG	500 MCG	750 MCG	1000 MCG	2000 MCG
2 mg	1 mL	2	20 mcg	5	10	12.5	15	25	37.5	50	100
2 mg	2 mL	1	10 mcg	10	20	25	30	50	75	100	200 X
2 mg	3 mL	0.667	6.7 mcg	15	30	37.5	45	75	112.5 X	150 X	300 X
2 mg	4 mL	0.5	5 mcg	20	40	50	60	100	150 X	200 X	400 X
2 mg	5 mL	0.4	4 mcg	25	50	62.5	75	125 X	187.5 X	250 X	500 X
5 mg	1 mL	5	50 mcg	2 X	4	5	6	10	15	20	40
5 mg	2 mL	2.5	25 mcg	4	8	10	12	20	30	40	80
5 mg	3 mL	1.667	16.7 mcg	6	12	15	18	30	45	60	120 X
5 mg	4 mL	1.25	12.5 mcg	8	16	20	24	40	60	80	160 X
5 mg	5 mL	1	10 mcg	10	20	25	30	50	75	100	200 X
10 mg	1 mL	10	100 mcg	1 X	2 X	2.5 X	3 X	5	7.5	10	20
10 mg	2 mL	5	50 mcg	2 X	4	5	6	10	15	20	40
10 mg	3 mL	3.333	33.3 mcg	3 X	6	7.5	9	15	22.5	30	60
10 mg	4 mL	2.5	25 mcg	4	8	10	12	20	30	40	80
10 mg	5 mL	2	20 mcg	5	10	12.5	15	25	37.5	50	100
15 mg	1 mL	15	150 mcg	0.7 X	1.3 X	1.7 X	2 X	3.3 X	5	6.7	13.3
15 mg	2 mL	7.5	75 mcg	1.3 X	2.7 X	3.3 X	4	6.7	10	13.3	26.7
15 mg	3 mL	5	50 mcg	2 X	4	5	6	10	15	20	40
15 mg	4 mL	3.75	37.5 mcg	2.7 X	5.3	6.7	8	13.3	20	26.7	53.3
15 mg	5 mL	3	30 mcg	3.3 X	6.7	8.3	10	16.7	25	33.3	66.7
20 mg	1 mL	20	200 mcg	0.5 X	1 X	1.2 X	1.5 X	2.5 X	3.8 X	5	10
20 mg	2 mL	10	100 mcg	1 X	2 X	2.5 X	3 X	5	7.5	10	20
20 mg	3 mL	6.667	66.7 mcg	1.5 X	3 X	3.8 X	4.5	7.5	11.2	15	30
20 mg	4 mL	5	50 mcg	2 X	4	5	6	10	15	20	40
20 mg	5 mL	4	40 mcg	2.5 X	5	6.2	7.5	12.5	18.8	25	50
30 mg	1 mL	30	300 mcg	0.3 X	0.7 X	0.8 X	1 X	1.7 X	2.5 X	3.3 X	6.7
30 mg	2 mL	15	150 mcg	0.7 X	1.3 X	1.7 X	2 X	3.3 X	5	6.7	13.3
30 mg	3 mL	10	100 mcg	1 X	2 X	2.5 X	3 X	5	7.5	10	20
30 mg	4 mL	7.5	75 mcg	1.3 X	2.7 X	3.3 X	4	6.7	10	13.3	26.7
30 mg	5 mL	6	60 mcg	1.7 X	3.3 X	4.2	5	8.3	12.5	16.7	33.3

5. Blends

A blend is several peptides lyophilised together in one vial. The most common are **GLOW** (GHK-Cu, BPC-157, TB-500) and **KLOW**, which is GLOW with KPV added — the name is literally KPV + GLOW.

A blend cannot be titrated

The ratio between the components is fixed when the vial is manufactured. Drawing less to reduce one component reduces all of them by exactly the same proportion. There is no way to take more of one and less of another out of a single vial — and because you cannot vary them independently, you cannot learn which one was responsible for anything you observe.

The arithmetic is the same as for a single peptide, applied to the *total* peptide mass, then split by each component's share.

KLOW — 80 mg total in the vial

WATER ADDED	TOTAL MG/ML	1 UNIT DELIVERS	GHK-CU	BPC-157	TB-500	KPV
2 mL	40	400 mcg total	250 mcg	50 mcg	50 mcg	50 mcg
3 mL	26.67	267 mcg total	166.7 mcg	33.3 mcg	33.3 mcg	33.3 mcg
4 mL	20	200 mcg total	125 mcg	25 mcg	25 mcg	25 mcg
5 mL	16	160 mcg total	100 mcg	20 mcg	20 mcg	20 mcg

Fixed ratio: GHK-Cu 62.5% · BPC-157 12.5% · TB-500 12.5% · KPV 12.5%. Drawing a smaller volume reduces every component by the same proportion.

GLOW — 70 mg total in the vial

WATER ADDED	TOTAL MG/ML	1 UNIT DELIVERS	GHK-CU	BPC-157	TB-500
2 mL	35	350 mcg total	250 mcg	50 mcg	50 mcg
3 mL	23.33	233 mcg total	166.7 mcg	33.3 mcg	33.3 mcg
4 mL	17.5	175 mcg total	125 mcg	25 mcg	25 mcg
5 mL	14	140 mcg total	100 mcg	20 mcg	20 mcg

Fixed ratio: GHK-Cu 71.4% · BPC-157 14.3% · TB-500 14.3%. Drawing a smaller volume reduces every component by the same proportion.

6. How long it keeps

Bacteriostatic water is sterile water with benzyl alcohol added — 0.9% (9 mg/mL) on the standard label — as a bacteriostatic preservative, supplied in a multiple-dose container from which repeated withdrawals may be made. **Preservative-free sterile water has none of that protection** and is intended for single use.

The widely quoted **28-day** limit for a punctured multi-dose vial is a pharmacy convention (USP <797> and CDC guidance for multi-dose containers), *not* a figure printed on the manufacturer's label — the Pfizer/Hospira label carries no discard date at all. So the binding limit is whichever is shorter:

- the 28-day multi-dose container window, and
- how long that particular peptide remains stable in solution — which for many is less, and is a question for the supplier's own stability data.

Storage, in order of how much it matters

- **Before mixing:** the dry powder is the stable form. Cool, dry, dark, sealed. Many are fine at room temperature for months in that state; the freezer is better for long holds.
- **After mixing:** refrigerate at 2–8 °C. Not the door, not the crisper drawer — both cycle in temperature. Keep it upright and dark.
- **Write on the vial.** Compound, concentration in mg/mL, the date you mixed it, and the date you will discard it. This single habit prevents more errors than anything else in this document.
- **Do not shake.** Run the water down the inside wall of the vial and let it dissolve. Foam means denatured protein.
- **Look before you draw.** Cloudiness, colour change or visible particles mean discard, not “probably fine”.

One label warning worth repeating

Bacteriostatic water is **not for use in neonates**. Benzyl alcohol is the reason.

7. The five errors that actually happen

1. **Confusing units with micrograms.** “10 units” is a volume, not a quantity of peptide. What 10 units contains depends entirely on how much water you added. Two people running the same protocol with different dilutions and the same unit count are taking different doses.
2. **Mixing mg and mcg.** 1 mg = 1000 mcg. A factor of a thousand is the single most dangerous slip available here, and it is easy to make when a supplier lists a vial in mg and a protocol in mcg.
3. **Too little water in a large vial.** A 15 or 30 mg vial reconstituted in 1 mL puts a small dose down at one or two units, where it cannot be measured. Look it up in the table before you pierce the stopper — once the water is in, you cannot take it out.
4. **Assuming a syringe is U-100.** U-40 and U-50 syringes exist. If yours is not U-100, every number in this document is wrong for it. Check the barrel.
5. **Not writing it down.** Three weeks later nobody remembers whether that vial got 2 mL or 3 mL, and the dose silently changes by 50%.

8. Supplies

- U-100 insulin syringes — 29–31 G, 0.3 mL or 0.5 mL barrels for anything under 50 units
- Bacteriostatic water (not sterile water, if you intend more than one withdrawal)
- 70% isopropyl alcohol swabs — for the stopper, every single time
- A sharps container. Not a bin.

- A fine permanent marker, and somewhere to keep a written log

An interactive version of every table in this document — including the blend arithmetic and a solver that tells you how much water to add — is at **peptidecompanion.pages.dev**. It runs entirely in your browser: nothing you type is stored or transmitted, and there is nothing to sign up for.

Companion material for *The Complete Peptide Protocols Playbook*. Educational reference only — not medical advice, and not a recommendation to use any compound.