Reconstitution Math, Without the Hand-Waving

2 divisions · 1 multiplication · 0 doses suggested

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THELONGEVITYDESK.ORG

About The Longevity Desk

The Longevity Desk is a research publication covering 65 compounds sold on the grey market. For each one we read the primary record: the trials, the labels, the regulator filings, and the independent lab tests. Then we report what that record actually says, including when the honest answer is that nobody knows yet. Every figure in this guide traces to a named source. Where a number has no source, we say so plainly instead of inventing one.

We hold ourselves to the standard we apply to everyone else. Every factual error we publish and then fix is logged publicly at **thelongevitydesk.org/corrections**: what we said, what is true, and how the mistake happened. If you find an error in this guide, it goes there too.

Educational material, not medical advice. This guide discusses dilution arithmetic only. It contains no doses and no suggestions about what to put in your body.

The short version

Reconstitution means adding water to a vial of dried powder. Working out what ends up in the syringe afterwards is division, twice, with one multiplication at the end.

Divide the amount of powder in the vial by the amount of water you put in, and you have the strength of the liquid. Divide the amount you are aiming for by that strength, and you have a volume. Multiply the volume by a hundred to get the mark on an insulin syringe, because a full millilitre is a hundred of those marks.

The error that actually happens is a mixed-up unit. Milligrams and micrograms are both a mass, one milligram is a thousand micrograms, and skipping that conversion before you divide hands you an answer ten times too big.

More water does not make a vial weaker. The same powder is spread through more liquid, and all it changes is where your target lands on the syringe.

None of this tells you what amount to aim for, and none of it can tell you whether the vial holds what the label says it holds.

Most reconstitution charts are a table of numbers with no indication of how they were arrived at. This is backwards, the arithmetic is simple enough that anyone can do it, and once you can do it you do not need to take anyone else's word for it. Including ours: every number in this guide can be checked by hand.

By the numbers

FIGURE	WHAT IT IS
1,000	Micrograms in one milligram. Mass, not volume. This is the conversion that causes real trouble
100	Units in 1 mL on a standard U-100 insulin syringe. So 10 units is 0.1 mL, always, regardless of what is in the syringe
5 mg/mL	A 10 mg vial reconstituted with 2 mL. Ten divided by two. There is no second step
5 units	250 mcg drawn from that 5 mg/mL solution. Skip the conversion to mg and you get 50 units. ten times too much

All of it assumes the vial contains what it is supposed to, and none of it says whether an amount is appropriate, safe or effective.

The whole thing in one line

Reconstitution is dilution, and dilution is division.

> **Concentration = amount in the vial ÷ volume of water added.**

That is it. A 10 mg vial reconstituted with 2 mL of bacteriostatic water is 10 ÷ 2 = 5 mg/mL. There is no second step and no hidden factors.

Units are where people go wrong

There are two different "units" and they have nothing to do with each other.

Milligrams and micrograms are measures of mass. 1 mg = 1,000 mcg. This is the conversion that causes real trouble, because it is easy to make a typo or a visual mistake reading the numbers.

Syringe units are volume. On a standard U-100 insulin syringe, 100 units = 1 mL. So 10 units = 0.1 mL, always, regardless of what is in the syringe. The syringe measures volume, it has no idea what it contains. That is the whole point of the arithmetic.

The procedure, in five steps

Two divisions and a multiplication, in order.

> **Units = (target mass ÷ concentration) × 100**

1. **Write down the amount in the vial, in milligrams.**

2. **Write down the volume of water you added, in millilitres.** The volume of the powder is treated as negligible; only the water counts.
3. **Divide the first by the second.** That is your concentration, in mg/mL.
4. **Convert your target amount into the same unit as the concentration.** Mass has to match mass before you divide, and 1 mg = 1,000 mcg.
5. **Divide the target mass by the concentration** for a volume in mL, **then multiply by 100** for syringe units. The 100 comes from the syringe, not from what is in it.

The target amount in step four is yours. This guide does not supply one.

A worked example

Say you have a 10 mg vial reconstituted with 2 mL, so 5 mg/mL, and your target is 250 mcg.

STEP	THIS EXAMPLE
Amount in the vial	10 mg
Water added	2 mL
Concentration	10 ÷ 2 = 5 mg/mL
Target, converted to mg	250 mcg = 0.25 mg
Volume	0.25 ÷ 5 = 0.05 mL
Syringe units	0.05 × 100 = **5 units**

The step people forget is the conversion. Dividing 250 by 5 without converting to mg gives 50 units, ten times too much, from a simple unit mistake. *(The figures are an example of the arithmetic, not a recommendation of an amount.)*

Volume to syringe units

VOLUME	INSULIN SYRINGE UNITS
0.05 mL	5 units
0.1 mL	10 units
0.2 mL	20 units
0.25 mL	25 units
0.5 mL	50 units
1.0 mL	100 units

Common vial and water combinations

Each row is simply (amount in vial ÷ water volume) × 0.1 mL to get per-10-unit amounts. Check any of them for yourself.

VIAL	WATER ADDED	CONCENTRATION	PER 10 UNITS (0.1 ML)
5 mg	1 mL	5 mg/mL	500 mcg
5 mg	2 mL	2.5 mg/mL	250 mcg
10 mg	1 mL	10 mg/mL	1,000 mcg (1 mg)
10 mg	2 mL	5 mg/mL	500 mcg
50 mg	2 mL	25 mg/mL	2.5 mg
200 mg	2 mL	100 mg/mL	10 mg
500 mg	5 mL	100 mg/mL	10 mg

Rows 1 and 4 deliver the same amount per unit from different vials. It is the concentration that determines what is in the syringe, not the vial.

Or let the calculator do the division

The reconstitution calculator at **thelongevitydesk.org/tools/reconstitution** runs the same arithmetic and prints every step, so you can check it rather than trust it. It has presets for common vial sizes and tells you when an amount lands between marks.

More water is not weaker, it is easier to measure

A common mistake is thinking that more water makes the solution weaker. It makes it more dilute, but the amount of substance is the same: a 10 mg vial has 10 mg of peptide regardless of how much water you add.

What more water does is make a small amount easier to measure. With 1 mL, a target of 250 mcg is 2.5 units, a fraction you cannot really measure on the syringe. With 3 mL, the same target is 7.5 units, right between two marks. With 2 mL it is 5 units, a whole number.

Dilute so your target lands on a mark you can actually measure. That is the only reason to pick one volume of water over another.

Storage

Facts, not suggestions:

- **Reconstituted solution goes in the refrigerator, not the freezer.** Lyophilized (freeze-dried) powder is stable at refrigerator temperatures and generally tolerant of shipping at room temperature. Once mixed, solutions are stored cold.
- **Read the label on the water: bacteriostatic and sterile are not the same thing.** Bacteriostatic water contains benzyl alcohol, which inhibits bacterial growth. Sterile water does not, and the two are not interchangeable once a vial is opened more than once.
- **Water goes down the side of the vial, not directly onto the powder.** Peptides are mechanically fragile, shaking or vigorous movement can damage them.

What this math does not tell you

The arithmetic is simple, but everything it is built on may not be.

It assumes the vial actually contains what it is supposed to. That is an assumption about the manufacturer, not the chemistry, and it is the only factor that can make all of this math wrong. A purity or fill-weight problem makes every calculation on this page incorrect in a way no amount of careful division will fix. (What testing has actually found inside vials is Desk Guide Nº 1.)

It says nothing about whether a particular amount is appropriate, safe, or effective. Those are entirely separate questions, and the confidence with which a dosing chart presents its numbers has a way of making people think the chart answers them too.

A number being calculable is not evidence that it is a good idea.

The Desk's take

We would rather you did the division by hand once before trusting the calculator, or us. A chart hands you a number with nothing attached to check it against, and this is one of the very few things in this field you can verify completely on your own, with no equipment and nobody's permission.

If you have used a vendor's chart to work out a volume, we want to know whether it showed you where its numbers came from, or only what they were: **hello@thelongevitydesk.org**.

Questions people ask

How do you calculate reconstitution concentration? Concentration is the amount in the vial divided by the volume of water added. A 10 mg vial reconstituted with 2 mL is 10 ÷ 2 = 5 mg/mL. There is no second step, and the volume of the powder is treated as negligible.

How many units is 0.1 mL on an insulin syringe? On a standard U-100 syringe, 100 units is 1 mL, so 0.1 mL is 10 units, regardless of what is in the syringe, because the syringe measures volume.

Why did my calculation come out ten times too high? Usually because the mass units were not matched before dividing. For a 5 mg/mL solution and a 250 mcg target, the target has to become

0.25 mg first. Dividing 250 by 5 instead of 0.25 by 5 returns 50 units rather than 5, ten times too much, from a unit mistake.

Does adding more water make a solution weaker? It makes it more dilute, but the amount of substance is the same. What changes is where a target lands on the syringe.

Is bacteriostatic water the same as sterile water? No. Bacteriostatic water contains benzyl alcohol, which inhibits bacterial growth; sterile water does not. They are not interchangeable once a vial is opened more than once.

Can this arithmetic be wrong? The division cannot, but what it rests on can. It assumes the vial contains what it claims, and it says nothing about whether an amount is appropriate, safe or effective.

Where to compare vendors

Biohack Blueprint (biohackblueprint.ai) lists what eleven vendors charge per milligram for the same compound, side by side, with each product's certificate linked where the vendor publishes one. It is our price directory, and its outbound links are affiliate links.

Where to go from here

- **The calculator, with every step shown**: thelongevitydesk.org/tools/reconstitution
- **What testing found inside real vials:** Desk Guide Nº 1, and thelongevitydesk.org/articles/buying-peptides-without-getting-ripped-off
- **Every term in plain language**: thelongevitydesk.org/glossary
- **One email a week at most**, nothing for sale: thelongevitydesk.org/subscribe

This guide only discusses dilution arithmetic. It is not medical advice, and it is not a recommendation to use any particular substance. Nothing on this page has been evaluated by the FDA.