

## How much protein can you take in during a single meal?

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It's something I'm sure you've all heard before although the exact number used varies. "You can only absorb \_\_\_ grams of protein in one meal," with 25g probably being the most commonly used number. Like with many pieces of broscience, the real answer is a lot more complex. Lets start with the simplest part of this, ignoring bodybuilding entirely. For men, the USRDA for protein is .8g/kg. That equates to 72g of protein for a 200lb male. Divided into 3 meals, that would only come to 24g per meal, which falls inside the 25g per meal myth. But that of course is the minimum recommended, not a maximum absorbable.

From what I've seen, I believe the myth started with some of the early studies on egg protein absorption. For whatever reason, 25g is the commonly used amount for egg protein studies, which is the amount roughly in 3 jumbo eggs, or 4 large eggs. There are numerous studies done with the egg protein showing various amounts escaping digestion. A fair example is this one [Amount and fate of egg protein escaping assimilation in the small intestine of humans -- Evenepoel et al. 277 \(5\): 935 -- AJP - Gastrointestinal and Liver Physiology](#) . The important piece to keep in mind is that even in this case the protein absorption throughout the digestive tract occurs over a 72 hour period given the time it takes to pass through the intestines, with a total recovery of approx 5% of the protein leaving the body rather than being used. But even with egg's high bioavailability and rapid absorption, you don't see peak levels until 3 hours or so post intake.

With other protein forms such as milk based (casein, whey, etc), you have both different digestion rates, as well as different absorption rates. This study [Compared with casein or total milk protein, digestion of milk soluble proteins is too rapid to sustain the anabolic postprandial amino acid requirement -- Lacroix et al. 84 \(5\): 1070 -- American Journal of Clinical Nutrition](#) specifically was looking at milk based proteins. What is interesting for the sake of this myth is the figure 3 graph of changes to serum amino acids. The milk soluble protein isolate reached a peak serum BCAA level 3x higher than either casein or total milk protein within 1 hour and remained 2x as high through the second hour. It dropped back to below the level of the other proteins by 4 hours. This was based on approx 22g of protein in each of the types. The important point demonstrated is that amino acid levels are able to be elevated significantly higher than what 22g of casein will raise it in a single meal. Note that the total milk protein and casein both showed elevated BCAA levels out to 8 hours, and overall elevated amino acid levels to 7 hours, showing how long a single meal can take to travel through digestion.

A similar study [The digestion rate of protein is an independent regulating factor of postprandial protein retention -- Dangin et al. 280 \(2\): E340 -- AJP - Endocrinology and Metabolism](#) was done using free amino acids, whey, casein and repeated whey meals. These were done with 30g. Even with the free form amino acids, peak plasma concentration of leucine (remember, this is basically eating a spoonful of leucine) wasn't until 60 minutes.

A compilation of protein studies is available as a separate study here <http://www.humankinetics.com/eJournal.../pdfs/5642.pdf> which gives some pretty specific numbers for protein absorption rates. Using caseins they show an approximate rate of 6g/hr, with whey at the top being 8-10g/hr. Using those as maximums per day, you can probably reach (in 3 meals) as much as 50g of casein, and still utilize it all. Whey on the other hand dose show the fast spike but relatively fast drop as well, so although there is a theoretical higher grams per hour its washout is also higher, requiring more frequent meals to maintain the absorption, so probably 25-30g as whey every 3 hours gets you optimal absorption.

So what does this all mean? Well, for starters it's pretty obvious that with casein supplying amino acids for as much as 9 hours post-meal and a max absorption in normal healthy individuals NOT weight training of around 6 grams per hour means that a meal as large as 54g of casein can be almost entirely absorbed. As far as fish, poultry or beef goes, there aren't nearly as many studies done, and none that are so granular in terms of timing. Given that eggs have around a 3g/hr rate, and pea/soy go from 3-4g/hr that it is not at all unreasonable to assume that animal sources have somewhere in the range of 3-10g/hr.

The piece missing from any studies I could find which could make a significant difference is the addition of carbohydrates and/or fats. Is it possible that with the addition of fats or fiber that a larger amount of whey proteins can be taken in a meal, with overall movement of the protein from stomach to amino acids in bloodstream would be slowed down enough that the 10g per hour could be maintained for 5 or 6 hours keeping the 10g/hr bloodstream absorption? I think it is likely to be the case, and hope that someday we see some studies done with more real world scenarios than fasted whey only meals.

So is the myth busted? You bet, it's definitely possible to take in as much as 50-60g of casein in a single serving, and use the vast majority of it, and that is for a non-weight training individual. With increased protein turnover in a bodybuilder, it's likely that you can absorb even more. The other thing I learned as I researched this that may interest many of the rest of you is as below

'An important question then must be posed: 'Does a more rapidly absorbable protein result in greater in vivo protein synthesis?' This is a central issue of large protein consumption with fitness enthusiasts, athletes, and bodybuilders. Early findings suggest that rapidly absorbed proteins such as free amino acids and WP, transiently and moderately inhibit protein breakdown, yet stimulate protein synthesis by 68% [using nonoxidative leucine disposal (NOLD) as an index of protein synthesis]. Casein protein has been shown to inhibit protein breakdown by 30% for a 7-h postprandial period, and only slightly increase protein synthesis. Rapidly absorbed amino acids, despite stimulating greater protein synthesis also stimulate greater amino acid oxidation, and hence results in a lower net protein gain, than slowly absorbed protein. Leucine balance, a measurable endpoint for protein balance, is indicated in Figure 1, which shows slowly absorbed amino acids (~ 6 to 7 g/h), such as CAS and 2.3 g of WP repeatedly taken orally every 20 min (RPT-WP), provide significantly better protein balance than rapidly absorbed amino acids.'

A quickie summary of this is that although casein seems to only slightly increase protein synthesis, overall there is a better net protein gain than with faster absorbed proteins such as whey, unless you feel like taking 3g of whey every 20 minutes. So I may be changing a bit more of what little I take in protein shakes now for more casein, or a mixed casein/whey source.

***Broscience Busted*** - There is no particular evidence that 25, 30, 40 or even 50g is a maximum absorbable in a single meal; the type of protein has a lot more bearing. As much as 60 or 70g protein from casein could be taken in and still be used over the next 8 hours even in a non-weightlifting individual.