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(This is a loose transcript of the highlights of Dr. Layman's lecture.)

Protein is a critical fuel for certain tissues. It is a major fuel in regulating liver metabolism. It is a dominant fuel for glutamate metabolism in the brain. It's a metabolic fuel for insulin release in the pancreas.

In animal studies, **if you want to have the most weight gain, you give a low protein, high carb diet.**

Much obesity research is done on what fat tissue does in the body- the production of inflammation, TNF alpha, etc. What Layman is saying is that it might be much more interesting to look the function of metabolically lean tissues.

Layman makes the point that many of the diets that have been shown to work well for weight loss do so because of their protein content.

The RDA for protein is the absolute minimum protein needed to maintain health. He said that while we don't have a lot of Kwashiorkor or marasmus, we do have sarcopenia and osteoporosis, which for Layman is a reflection of protein malnutrition.

**Layman makes the point that we need an absolute amount of protein each day. It is not correct to think of protein as a percentage of the diet. It needs to be an absolute number.** When you eat with the percentage idea, and you shrink down calories, you will not get adequate protein. You will lose muscle and bone mass.

**The average older person gets around 1400 calories per day. It is very important with this small level of food intake that there be adequate protein.**

A lot of diet policy is driven from a fear of fat which often translates into a fear of animal food. If you follow this fear of fat, what you are left with is a low fat, low protein, high carb diet. The United States is the only country in the world that has a dietary recommendation on cholesterol.

When doing epidemiology, if you look at a fast food diet versus a home cooked diet, they may look the same in the usual way of measuring these things, but there is a big difference in what is actually being eaten. Roasted chicken is treated the same as chicken nuggets. When you look at the results you will conclude that animal proteins are bad for you.

**When you trade out fat for carbohydrates, eating more fat and less carbohydrates, all the blood lipid levels will improve.**

**When you trade out protein for carbohydrate, eating more protein and less carbohydrate, you get similar changes in blood lipids. You also get increased satiety and increased thermogenesis (probably due to protein turnover, largely in muscle).**

**More significantly, you get a change in body composition. By lowering the carbohydrates, you get an increased utilization of fat, you get increased maintenance of lean muscle mass. You have switched on your metabolism.**

If you lose weight while restricting the amount of protein you eat, you can lose weight, but end up with the same body composition. **You lose muscle and fat.**

If the patient doesn't have a 30% drop or more in triglycerides, you can be pretty sure that they are not following a low carb diet.

If you teach a high protein diet the food pyramid way, with low animal foods and frequent small meals, it will fail.

The RDA for protein is the bare minimum amount of protein that you can get by with. It assumes good health, adequate digestion and modest levels of exercise. This will keep you in positive nitrogen balance, meaning adequate protein. However, 75% of people are overweight, and 70% are sedentary.

The RDA has nothing to do with optimum health.

As we age, our ability to utilize amino acids and essential amino acids goes down. Our efficiency decreases. Quantity and quality need to increase with age.

When we wake up from an overnight fast, we are burning fat, but we are also in a catabolic state and breaking down lean (protein) tissue. **When we eat protein in the morning, we enter an anabolic state. It oscillates like this through the day. The problem is that the average American takes in over 65% of their protein in one meal, that being dinner. The average American eats about 12 grams of protein at breakfast. This is inadequate to enter an anabolic state. The protein here gives you nothing but calories. You are getting no special protein benefit at all from eating it.**

If you aim for 30 grams of protein at each meal, you will get a different body composition.

If you eat a high carb diet or a diet inadequate in protein, you will have high insulin, build up fat in storage, continue to break down muscle, and break down bone.

**Giving 5 smaller meals in a day, even if the total protein is adequate, will result in a negative nitrogen balance on the whole for the day. You are losing muscle and bone mass. A given meal must have 25-30 grams of protein for there to be enough of the amino acid leucine to keep metabolism on track.**

Children can do well on a lower protein, higher carb diet because of growth hormone and a very strong anabolic drive. When we are young, insulin is very effective at increasing protein use. Insulin is a growth hormone. When you are growing, higher carbohydrate, lower protein diets are beneficial. **When you reach the age of 25-35 or so, insulin starts to lose its effectiveness as a growth hormone. The distribution of protein through the day becomes important.**

**The majority of protein is used for repair and remodelling. A lack of adequate protein is the origin of muscle wasting and bone loss.**

The signaling receptor called mTor is uniquely sensitive to the level of leucine in a meal. Early in life, this pathway is controlled by hormones and modulated by leucine. Later in

life, the hormones drop out, and the **regulation is taken over by leucine entirely**. All your protein metabolism is regulated by this pathway. It regulates when there is adequate protein in bolus amounts. In other words, the regulation doesn't happen until you get a 2-3 fold increase in leucine. **Protein synthesis is shut down until this happens.**

Insulin is a growth hormone. In children we get protein and fat formation from insulin. In adults, we only get fat formation.

**When we are fasting, we enter a catabolic period where we break down protein and fat. We need enough protein to enter an anabolic period. Most people do not get enough protein through the day until the dinner meal.**

The average American gets 12 grams of protein at breakfast, which is insufficient to enter the anabolic phase.

With the way the standard American diet is, there ends up being an **excess of insulin which triggers fat storage, while at the same time the lack of adequate protein leaves the person in a catabolic state through the day. Lean tissue is broken down.**

Layman discusses a study in animals where two groups were given exactly the same amount of food, exactly the same foods, with **the only difference being the distribution through the day. There were marked changes in body composition, even though the totals per day were exactly the same. In the group that got the protein spread evenly in three meals, there were significant gains in lean body mass. There was significantly more fat and less lean body mass in the diet that mimicked the protein distribution found in the standard American diet.**

**You can see the change in three weeks.**

He talked about another study where the same diet was fed except that the source of protein was different. Those that got the vegetable protein had significantly less lean muscle mass and more fat mass after a mere three months of being on this diet. Vegetable protein has much less leucine in it.

**You need about 2.5 grams of leucine per meal which takes about 30 grams of mixed animal and vegetable protein.**

**The meal to correct first is breakfast. If you don't correct breakfast, you will not see a change in body composition.**

High protein diets are twice as effective at positively changing body composition and twice as effective at lowering body fat.

If you teach the food guide pyramid, you primarily teach avoidance of certain foods. If you teach meals and protein, you make sure that each meal has adequate protein, and you reduce refined carbohydrates. You reduce the poor quality fats. You must teach the patient to have a good breakfast.

The amount of fat in the diet only becomes relevant if the person is taking in too many calories.