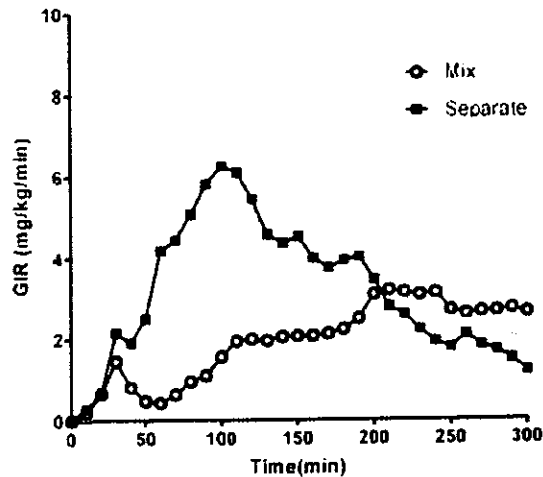


Summary Prepared by Rob Lindsay, MD

Insulin

There were three reports that I wanted to pass along concerning insulin. There really was very little work done on new insulins and you will notice that I say nothing this time about inhaled insulin or oral insulin. These topics simply did not come up. The group from Yale presented “Should We Mix Lispro With Glargine?” They noted that despite manufacturers cautions against mixing Glargine with rapid acting insulin analogues, clinical studies have failed to demonstrate deleterious effects of mixing on glucose excursions or A1c levels. They chose to do a formal euglycemic clamp study to see what effect it had. It can be demonstrated in the following graph.

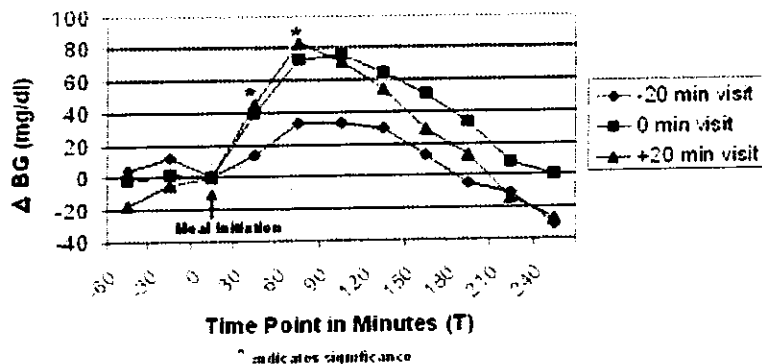
**Mean Glucose Infusion Rate during Euglycemic Clamp
for Mixed & Separate Injections**



They concluded, “these data demonstrate that mixing Lispro with Glargine markedly flattens the early pharmacodynamic peak of Lispro and causes a shift to the right in the curve. Thus in spite of practical advantages, the changes in pharmacodynamics that result in mixing Lispro and Glargine are likely to lead to difficulties in controlling meal related glucose excursions in daily diabetes management. *What they are saying here is that mixing the Humalog and Lantus causes the Humalog to not work particularly well early on. This means that the post-prandial blood sugars would be considerably higher. Thus the idea of mixing Humalog or NovoLog with Lantus is not a good one.* A study

from the Barbara Davis Center looked at the timing of meal insulin boluses to achieve optimal post-prandial glycemic control. They noted that there is a problem because blood glucose levels typically peak sixty minutes after eating carbohydrates whereas rapid acting insulins peak after approximately ninety minutes. They looked at twelve young adult patients and tested them with three different insulin administration times: twenty minutes before the meal, zero minutes before the meal and twenty minutes after the start of the meal. They then measured glucose levels and their results are in the following chart.

Change in Blood Glucose Over Time



They found a significant difference in the shift of blood glucose for the negative twenty-minute versus the zero minute visit and in the negative twenty minute visit versus the plus twenty minute visit. They concluded that changing insulin administration time to at least twenty minutes prior to a meal may be beneficial in reducing post-prandial blood glucose excursions and maintaining blood glucose levels of less than 180 mg/dL. *I remember when Humalog first came out it was noted that you didn't really have to worry about timing anymore because it worked so fast. It is true that it works much faster than regular insulin but we are finding more and more that the timing remains critical. I routinely ask my patients to give their insulin ten minutes before eating whenever possible when their blood sugars are in the normal range. This study indicates that I may be too conservative and we really should be giving it sooner than that. Possibly there is a role for Exenatide in this scenario. By adding Exenatide we may be able to prevent the prolonged waiting period that this study indicated we should follow. I wish I had more to report on insulin this time but it just was not a popular topic. There may be new things next year.*