基础-餐时胰岛素
长效和速效胰岛素疗法

基础-餐时胰岛素是什么意思？	很多 1 型糖尿病患者将长效（基础）与速效（餐时）胰岛素联用。这种被称为"基础-餐时"胰岛素。您将与自己的糖尿病管理师一起学习如何计算每天所需的基础-餐时胰岛素剂量。 您的目标是使用基础-餐时胰岛素将血糖维持在目标范围内。本手册主要介绍如何计算餐时胰岛素。
基础胰岛素 （长效）	是指为控制夜间和两餐之间的血糖水平而作为背景胰岛素注射的胰岛素。
胰岛素名称： 甘精胰岛素（来得时/Basaglar）	• 作用是确保血糖在两餐之间和整个夜间保持在目标范围内。其与肝脏释放的葡萄糖一同发挥作用。 • 剂量通常每天保持不变。如果血糖不在目标范围内，您的医生或糖尿病管理师会建议调整剂量。 • 持续 12 至 24 小时。 • 每天在同一时间注射。
餐时胰岛素 （速效）	是指为快速抵消摄入的碳水化合物和/或降低高血糖而快速推注的胰岛素。
胰岛素名称：优泌乐、诺和锐	• 作用是根据摄入的食物提供适量的胰岛素（称为"碳水化合物餐时量"）和/或降低高血糖（称为"校正餐时量"）。 • 每次注射的剂量均不同，取决于血糖以及摄入的食物/碳水化合物量。 • 持续约 3 小时。 • 通常在餐前和吃零食前（在摄入碳水化合物时）注射。

如欲了解更多信息
• 内分泌科
  206-987-2640
• 咨询孩子的医务人员
• seattlechildrens.org/patient-education

免费口译服务
• 在医院内，请咨询护士。
• 在医院外，请拨打家属免费口译热线：1-866-583-1527。告诉口译员您呼叫对象的姓名或分机号码。

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餐时（优泌乐/诺和锐）胰岛素剂量计算

如何知道在进餐时和吃零食时需要多少速效餐时胰岛素？

问自己以下 3 个问题：	• 将要摄入多少克碳水化合物？ • 现在的血糖 (BG) 是多少？ • 在接下来的几个小时里，计划进行多少体力活动？

1. 将要摄入多少碳水化合物？	首先，计算膳食或零食中碳水化合物的克数。 胰岛素/碳水化合物比率 • 需要知道自己的胰岛素/碳水化合物比率。根据该比率，可确定对于将要摄入的碳水化合物克数，需要注射多少单位的胰岛素。 • 每个人的胰岛素/碳水化合物比率各不相同 - 其因体型/体重和身体对胰岛素的敏感度而异。 • 比率示例 1：每 10 克碳水化合物 1 个单位的优泌乐/诺和锐 - 1:10 • 比率示例 2：每 30 克碳水化合物 ½ 个单位的优泌乐/诺和锐 - ½:30 • 知道了碳水化合物比率值（胰岛素/碳水化合物比率）后，便可使用该值来计算碳水化合物餐时量。 • 应该在进餐前 15 分钟注射优泌乐/诺和锐。如果无法确定幼儿会进食多少膳食或零食，可在餐后注射。 胰岛素/碳水化合物比率为：_____ 碳水化合物克数 ÷ 胰岛素/碳水化合物比率 = 碳水化合物餐时量

2. 血糖值是多少？	如果需要校正（降低）高血糖值，需要注射校正餐时量。如果血糖高于医生确定的数值，需要校正餐时量。 校正因子 根据校正因子，可确定自己对胰岛素的敏感程度 - 其为对需要多少优泌乐/诺和锐才能将血糖降至目标值的估算值。白天和睡前/半夜的目标值不同。每个人都有自己独特的校正因子，由医生确定。校正因子为 50 意味着 1 个单位的优泌乐/诺和锐会将血糖值降低 50 个点。 个人校正因子为：_____ 如要计算校正餐时量，需要知道校正因子。

目标
血糖

白天：

_____

睡前/半夜：

_____

现在，我们来计算校正餐时量：

（当前血糖 - 目标血糖）÷ 校正因子 = 校正餐时量

$$\boxed{} \quad \text{-} \quad \boxed{}$$

当前血糖　　　　　目标血糖

_____

校正因子

如果距上次注射优泌乐/诺和锐不到 3 个小时，切勿注射校正餐时量。

碳水化合物餐时量 + 校正餐时量 = 总餐时剂量（优泌乐/诺和锐）

示例：

时间	BG	碳水化合物餐时量	校正餐时量
早上 8 点早餐	315	**需要**	需要
上午 10 点零食	170	**需要**	不需要（距上次包含校正餐时量的餐时剂量仅 2 个小时）
中午 12 点午餐	150	**需要**	不需要（距上次餐时剂量仅 2 个小时；由于血糖现在已达标，因此无需校正剂量）
下午 3 点零食	298	**需要**	**需要**（距上次注射已 3 个小时，且血糖高）
下午 5 点晚餐	236	**需要**	不需要（距上次餐时剂量仅 2 个小时）
晚上 8 点	315	**不需要**	**需要**，采用睡前目标值。

3. 在接下来的几个小时里，计划进行多少体力活动？

- 每增加 30 至 60 分钟的活动，则额外进食 15 克碳水化合物的零食。请勿通过注射胰岛素来抵消上述碳水化合物。

  或

- 如果知道自己将在餐后或吃零食后几小时内活动，可能需要将为膳食或零食计算的碳水化合物总量减去 15 克。这将减少该剂量的优泌乐/诺和锐量。

餐时剂量示例

孩子早餐时的血糖为 275。他将要摄入 50 克碳水化合物，然后去游泳训练 60 分钟。他的碳水化合物比率是 1:10。他的目标血糖是 150，他的校正因子是 50。则优泌乐/诺和锐剂量是多少？

当前血糖：275   碳水化合物比率：1:10
摄入的碳水化合物克数：50   校正因子：50
目标：150

牢记那 3 个问题：

- 将要摄入多少克碳水化合物？ 50
- 现在的血糖是多少？ 275
- 在接下来的几个小时里，计划进行多少体力活动？60 分钟游泳。

答案：
步骤 1. 计算碳水化合物餐时量。
摄入的碳水化合物克数减去计划活动所需的 15 克，除以胰岛素/碳水化合物比率 = 碳水化合物餐时量

   50   摄入的碳水化合物
- 15   减去活动所需的 15 克
   35   调整后的碳水化合物摄入量

$$\overset{\displaystyle 3.5}{10\,\big)\,\overline{35}}$$

碳水化合物比率： 3.5 碳水化合物餐时量
10) 35   调整后的碳水化合物

步骤 2. 计算校正餐时量。
（当前血糖 - 目标血糖）÷ 校正因子 = 校正餐时量

  275   当前血糖
- 150   减去目标血糖
  125   超出目标的血糖

校正餐时量
校正因子： 2.5 超出目标的血糖
50) 125

步骤 3. 计算总餐时剂量
碳水化合物餐时量 + 校正餐时量 = 总餐时剂量（优泌乐/诺和锐）

3.5 + 2.5 = 6 个单位

3.5	+	2.5	=	6 个单位
碳水化合物餐时量		校正餐时量		总剂量 优泌乐/诺和锐

调整胰岛素剂量：
- 参加胰岛素剂量调整课程，学习如何自行更改胰岛素剂量。
- 每天致电血糖热线，然后按照指示操作。

  血糖热线：206-987-2640
  或发送电子邮件至 endonurse@seattlechildrens.org

  也可以在需要胰岛素剂量方面帮助的任何时候致电血糖热线。

今日剂量（基础胰岛素）

来得时/Basaglar（基础胰岛素）	
	睡前（晚上 8 点至 10 点）
	早晨（早上 8 点至 10 点）

今日剂量（餐时胰岛素）

优泌乐/诺和锐	每_____克碳水化合物注射_____个单位
	校正因子_____
	白天目标_____
	睡前/半夜目标血糖是_____

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Basal-Bolus Insulin
Long-acting and rapid-acting insulin therapy

What do the words basal-bolus insulin mean?	Many people with Type 1 diabetes use a combination of long-acting (basal) and rapid-acting (bolus) insulin. This is called "basal-bolus" insulin. You will work with your diabetes educator to learn how to figure out how much basal-bolus insulin you will need every day.

Your goal is to use basal-bolus insulin to keep your blood glucose in target range. This handout is mostly about calculating **bolus insulin**. |
| **Basal insulin (long acting)** | Refers to the insulin you inject as background insulin to control blood glucose levels overnight and between meals. |
| **Insulin name: Glargine (Lantus/Basaglar)** | • Works to keep blood glucose in the target range between meals and through the night. It works with the glucose that is released by the liver.
• Dose usually remains the same from day to day. Your doctor or diabetes educator will recommend an adjustment when blood glucose is not in target range.
• Lasts 12-24 hours.
• Taken at the same time every day. |
| **Bolus insulin (rapid acting)** | An insulin injection given as a burst to quickly counter carbs eaten and/or to lower high blood glucose. |
| **Insulin names: Humalog, Novolog** | • Works to provide insulin in the right amount for the food you are eating (this is called a "Carb Bolus") and/or to lower high blood glucose (this is called a "Correction Bolus").
• Dose will be different each time you take it depending on blood glucose and the food/amount of carbohydrates you are eating.
• Lasts about 3 hours.
• Usually taken before meals and snacks (when you eat carbohydrates). |

Figuring out your bolus (Humalog/Novolog) insulin doses

How do you know how much rapid acting bolus insulin you need for mealtimes and snacks?

Ask yourself these 3 questions:

- How many grams of carbohydrates are you going to eat?
- What is your blood glucose (BG) now?
- How active are you going to be during the next few hours?

1. How many carbs are you going to eat?

First, add up the grams of carbohydrates in the meal or snack.

Insulin/Carbohydrate Ratio

- You need to know your Insulin/Carbohydrate Ratio. It tells you how many units of insulin you need to take for the grams of carbs you are going to eat.
- Everyone has a different insulin/carbohydrate ratio – it's based on your size/weight and your body's sensitivity to insulin.
- Ratio example #1: 1 unit of Humalog/Novolog per 10 carbs – 1:10
- Ratio example #2: ½ unit of Humalog/Novolog per 30 carbs – ½:30
- Once you know your carb ratio number (your insulin/ carbohydrate ratio), you will use it to figure out your Carb Bolus.
- You should inject Humalog/Novolog 15 minutes before you eat. Young children can get this after their meal if it is uncertain how much of the meal or snack they will eat.

Your insulin/carb ratio is: _____

Grams of Carbohydrates ÷ Insulin/Carbohydrate Ratio = Carb Bolus

2. What is your blood glucose number?

The Correction Bolus is taken when you need to correct (lower) a high blood glucose number. You will need a Correction Bolus when your blood glucose goes above the number determined by your doctor.

Correction Factor

Your Correction Factor tells you how sensitive you are to insulin – it is an estimate of how much Humalog/ Novolog you need to lower your blood glucose down to your target number. You will have a different target number for daytime and bedtime/middle of the night. Everyone has a Correction factor, unique to them, determined by their doctor. A Correction Factor of 50 means that 1 unit of Humalog/Novolog lowers your blood glucose by 50 points.

Your personal correction factor is: _____

To calculate your Correction Bolus, you need to know your Correction Factor.

Your target blood glucose

Daytime:

_____

Bedtime/middle of the night:

_____

Now, let's figure out your **Correction Bolus:**

(Current blood glucose - target blood glucose) ÷ Correction Factor = Correction Bolus

Current blood glucose		target blood glucose

Current blood glucose   target blood glucose

_____

Correction Factor

DO NOT give a Correction Bolus if it has been less than 3 hours since the last Humalog/Novolog injection was given.

Carb Bolus + Correction Bolus = Total Bolus Dose (Humalog/Novolog)

Example:

Time	BG	Carb Bolus	Correction Bolus
8 a.m. breakfast	315	**Yes**	Yes
10 a.m. snack	170	**Yes**	No (only 2 hours since last bolus dose with correction bolus)
12 p.m. lunch	150	**Yes**	No (only 2 hours since bolus dose; no correction dose as blood glucose now on target)
3 p.m. snack	298	**Yes**	**Yes** (3 hours since last injection and blood glucose high)
5 p.m. dinner	236	**Yes**	No (only 2 hours since last bolus dose)
8 p.m.	315	**No**	**Yes** using bedtime target.

3. How much activity will you be doing in the next few hours?

- For every 30-60 minutes of increased activity, eat an extra 15-gram carb snack. DO NOT TAKE INSULIN TO COVER THESE CARBS.
  Or
- If you know you are going to be active within a few hours after a meal or snack, you may want to subtract 15 grams from the total number of carbohydrates you are counting for your meal or snack. This will give you less Humalog/Novolog for that dose.

Bolus dose example

Your child's blood glucose at breakfast is 275. He is going to eat 50 carbs and then he is going to a 60-minute swim practice. His carb ratio is 1:10. His target is 150 and his Correction Factor is 50. What is the dose of Humalog/Novolog?

Current blood glucose: 275   Carb Ratio: 1:10
Grams of carbs eating: 50   Correction Factor: 50
Target: 150

Remember the 3 questions:

- How many grams of carbohydrates are you going to eat? 50

- What is your blood glucose now? 275

- How active are you going to be during the next few hours? 60 min. swim.

Solution:

Step 1. Figure your **Carb Bolus**.
Grams of Carbohydrates LESS 15 grams for planned activity divided by Insulin/Carbohydrate Ratio = **Carb Bolus**

   50   Carbs eaten
- 15   Minus 15 for activity
   35   Adjusted carbs eaten

$$\text{Carb ratio: } 10 \overline{)\, 35}^{\,3.5} \quad \begin{array}{l}\text{Carb bolus} \\ \text{Adjusted carbs}\end{array}$$

Step 2. Figure your **Correction Bolus**.
(Current blood glucose - target blood glucose) ÷ Correction Factor = **Correction Bolus**

  275   Current blood glucose
- 150   Minus target blood glucose
  125   Amount over target

$$\text{Correction factor: } 50 \overline{)\, 125}^{\,2.5} \quad \begin{array}{l}\text{Correction bolus} \\ \text{Amount over target}\end{array}$$

Step 3. Figure your **total Bolus Dose**
Carb Bolus + Correction Bolus = **Bolus Dose** Humalog/ Novolog
3.5 + 2.5 = 6 units

3.5	+	**2.5**	=	**6 units**
Carb Bolus		Correction Bolus		Total dose Humalog/Novolog

Adjusting insulin dosages:

- Take insulin dose adjustment class to learn how to change insulin doses on your own.
- Call into Blood Glucose Line daily, then as instructed.
  Blood Glucose Line 206-987-2640
  or email to endonurse@seattlechildrens.org

  You may also call into the Blood Glucose Line any time you need help with insulin dosages.

Today's Dose (Basal)

Lantus/Basaglar (basal)	
	Bedtime (8-10 p.m.)
	Morning (8-10 a.m.)

Today's Dose (Bolus)

Humalog/ Novolog	
	_____ unit per _____ grams carbs
	Correction Factor is _____
	Daytime target is _____
	Bedtime/middle of the night target is _____

10/24
PE1255