

The residual (intestinal) fraction contained comparable low amounts of sucrose for both test products ( $42.3 \pm 3.1$  mg refined sugar vs.  $27.7 \pm 12.8$  mg Less refined sugar).

#### Bioaccessibility of glucose+fructose after brush border treatment

Disaccharides such as sucrose, which became bioaccessible, were measured in dialysate fractions over time. After subsequent brush border enzyme treatment, sucrose is enzymatically converted into glucose and fructose. The measured glucose and fructose measurement is shown in Figure 7.

The pattern of bioaccessible glucose+fructose over time for the less refined sugar follows a similar curve compared with the reference sugar. The total amount, however, is less for the less refined sugar compared to the reference (Figure 8). The difference between the two is strongest between 30 min and 80 min after the start of the experiment.

The recovered amount of sucrose in tiny-TIM, i.e. residual fraction and dialysate, for the test products was  $6934.1 \pm 67.5$  mg (Refined cane sugar) and  $6965.9 \pm 173.7$  mg (Less refined sugar). This recovered amount of sucrose was used to calculate the available glucose+fructose after brush border treatment as % of recovery (sucrose).

At the end of the experiment  $96.0 \pm 4.5\%$  glucose+fructose of recovered sucrose (average  $\pm$  sd,  $n=2$ ) was bioaccessible from the reference test product, while  $77.5 \pm 5.2\%$  glucose+fructose of input (average  $\pm$  sd,  $n=2$ ) was bioaccessible from the less refined sugar. The less refined sugar is about 20% less bioavailable in the stomach and small intestine than refined white sugar.

#### Discussion and conclusions

The test products were tested in tiny-TIM using TIMcarbo technology. During passage of the test products through the lumen in TIM simulating the upper gastrointestinal tract, the carbohydrates were digested. If complex carbohydrates (ie carbohydrates comprising more than two saccharide units) were present, then they would have been digested to mono-, di- and oligosaccharides. The disaccharides (sucrose) and monosaccharides were dialyzed from the lumen and subsequently treated with brush border enzymes containing sucrase.

Less refined sugar contains polyphenols from sugar cane. The hypothesis is that phenols inhibit the digestion of sugar (saccharose/sucrose, a disaccharide) and hence absorption of monosaccharides (e.g. glucose). The digestion of disaccharides