

Not Just How Much—How Much, How Often

A class of molecules called green tea catechins appear to block the digestion of fatty acids. However, since not everybody likes green tea, supplement companies sell pills that contain green tea extracts that include green tea catechins (as well as large number of other molecules).

Consider one individual: a 46-year-old female weighing 70 kg who has lived her whole life on the island of Taiwan. Throughout a typical day, she drinks 10 cups of green tea (one every hour between 7:00 a.m. and 4:00 p.m.), each containing 40 mg of green tea catechins.

What is the dose of catechins in each exposure (i.e., each cup)? (answer: 0.57 mg/kg)

The half life of this dose of catechins is 15 minutes; blood levels of catechins return to zero after 45 minutes. The blood concentration of catechins from this dose reaches its peak of 6.9 mg/dl after 10 minutes.

Draw the absorption/elimination curves of green tea catechins from each cup of tea throughout the day.

Now, consider a 46-year-old female weighing 70 kg who has lived her whole life in Kansas. On a typical morning, she takes green tea catechin supplement pills. However, she (unwisely) **exceeds the recommended dosage** on the bottle and consumes 4 pills, each containing 100 mg of catechins at 7:00 a.m. (The recommended dose is 1 pill.)

What is the dose of catechins in this exposure? (answer: 5.7 mg/kg)

The half life of this dose of catechins is 200 minutes; blood levels return to zero after 480 minutes. The blood concentration of catechins from this dose reaches its peak of 69 mg/dl after 20 minutes.

Draw the absorption/elimination curve of green tea catechins from this large supplement dose taken at the beginning of the day.

What is the total daily dose for each woman? (answer: 5.7 mg/kg daily dose; 400 mg daily exposure)

Now consider that the blood level at which catechins block digestion of fatty acids (possibly leading to weight loss benefits) is 5.0 mg/dl. **Estimate how much time** (i.e., how many total minutes throughout the day) **each woman gets this benefit from the green tea catechins.** (answer: ten small doses: about 300 minutes; one large dose: about 420 minutes)

Next, consider that at blood concentrations above 40 mg/dl, green tea catechins are quite toxic, causing damage to the liver! **Estimate how much time** (i.e., how many total minutes

throughout the day) **each woman suffers this harm from the green tea catechins.**

(answer: ten small doses: exactly 0 minutes; one large dose: about 180 minutes)

