

**Q:** Will consuming potatoes with green patches make you sick?

**A:** No. Green spots or patches on potatoes (known as “greening”) are a natural result of chlorophyll production in the tuber from being exposed to light.<sup>1</sup> Chlorophyll is not toxic; however, its presence indicates an increase in the production of solanine. Solanine is a glycoalkaloid that can cause gastrointestinal symptoms (e.g., nausea, vomiting and diarrhea), but only if consumed in very large amounts.<sup>1-3</sup>

## FACTS

- **Greening and glycoalkaloids are naturally occurring in potatoes:** Exposure of potatoes to light either in the field, in storage, on grocery store shelves or at home can cause green pigmentation to form on the surface of the potato. This “greening” is due to the formation of chlorophyll, a pigment that is found in many plant foods including lettuce, spinach and broccoli. In and of itself, chlorophyll is not a health concern; it is harmless and tasteless. But, in potatoes, chlorophyll formation is associated with formation of glycoalkaloids, most notably solanine. Increased solanine levels will cause potatoes to taste bitter and at very high intakes can cause gastrointestinal symptoms (e.g., nausea and vomiting.)<sup>1,2</sup>
- **Only light exposure causes chlorophyll formation but other things can cause an increase in glycoalkaloids in potatoes.** Unlike chlorophyll, light is not needed for glycoalkaloid formation in potatoes, but is substantially promoted by it. Other factors that can increase glycoalkaloid levels in potatoes include:
  - Wounding (e.g., bruising, cutting, slicing) during harvesting or post harvesting.
  - Processing particularly if it removes water (e.g., making chips or fries) because it can concentrate the glycoalkaloids.
  - Storage under very hot or very cold conditions or excessive exposure to sunlight.
- **Potatoes as typically consumed contain little solanine.** The highest levels of glycoalkaloids are typically found in the sprouts, flowers, leaves or other actively growing areas of the tuber which are not the parts of potatoes that people typically consume.<sup>1</sup> Concentrations of glycoalkaloids are higher in immature potatoes and are diluted as the tuber grows and matures.<sup>1</sup> It should also be noted that potato breeding programs have resulted in the commercial release of only potato lines with very low levels of solanine.<sup>2</sup>
- **Acceptable limits:** The FDA considers the maximum acceptable glycoalkaloid content to be 20-25 mg/100 g fresh potato weight (or 200-250 parts per million (ppm)). One would have to consume significantly more than is ever found in a serving of potatoes to be toxic. For example, the mean toxicity response in humans for glycoalkaloids is 3 mg/kg body weight (range 1-5 mg/kg body weight). Assuming that a potato contained glycoalkaloids at the advisory level of 200 ppm, an 80 kg (176 lb.) person would have to consume an entire kilogram of the affected areas of a potato in a serving to trigger a toxic response. Also note that potatoes with this high a level of glycoalkaloids would have a bitter, burning taste that would be unpleasant to consumers.<sup>4</sup>
- **Minimizing glycoalkaloid formation:** Strategies can be employed at harvesting and post-harvesting to reduce glycoalkaloid formation in potatoes.<sup>3</sup>
  - **Harvesting:**
    - Keep tubers well covered with soil during growing.
    - Allow tubers to mature before harvest. Avoid harvesting on warm sunny days.
    - Avoid handling methods that cause bruising or physical damage to potatoes.
  - **Post Harvesting:**
    - Store in cool, dark place.
    - If you see a spot of green on a potato, cut it out and eat the remainder.

## REFERENCES

1. Woolfe JA. The Potato in the Human Diet. Cambridge University Press, Great Brittan. 1987. pp 162-181.
2. University of Nebraska Institute of Agriculture and Natural Resources. Greening potatoes: The problem; the solution. Cropwhatch. <https://cropwatch.unl.edu/potato/greening>. Accessed October 10, 2017.
3. Friedman M. Potato glycoalkaloids and metabolites: roles in the plant and in the diet. J Agric Food Chem. 2006; 54:8655-8681.
4. Dolan LC, Matulka RA, Burdock GA. Naturally occurring food toxins. Toxins. 2010; 2:2289-2332.