



*Effect of food composition,  
temperature: Examples from  
asparagus to sweetpotatoes*

*Henry B. Chin, Ph.D.*

*National Food Processors Association*

*Dublin, CA*



# *Acrylamide is:*

- Acrylamide is not a chemical contaminant
- It is a complex issue involving the reaction of normal food components under typical conditions of the cooking of foods
- We're still discovering new information on its occurrence and formation

# *Acrylamide in Foods is a Complex Issue*

- We know some factors, e.g., asparagine, reducing sugars, and temperature
- These may not be the only factors
- “Known” starting materials are widely distributed in foods of plant origin (vegetables, grains, fruits)
- Ultimately must “do no harm” while we understand the issue

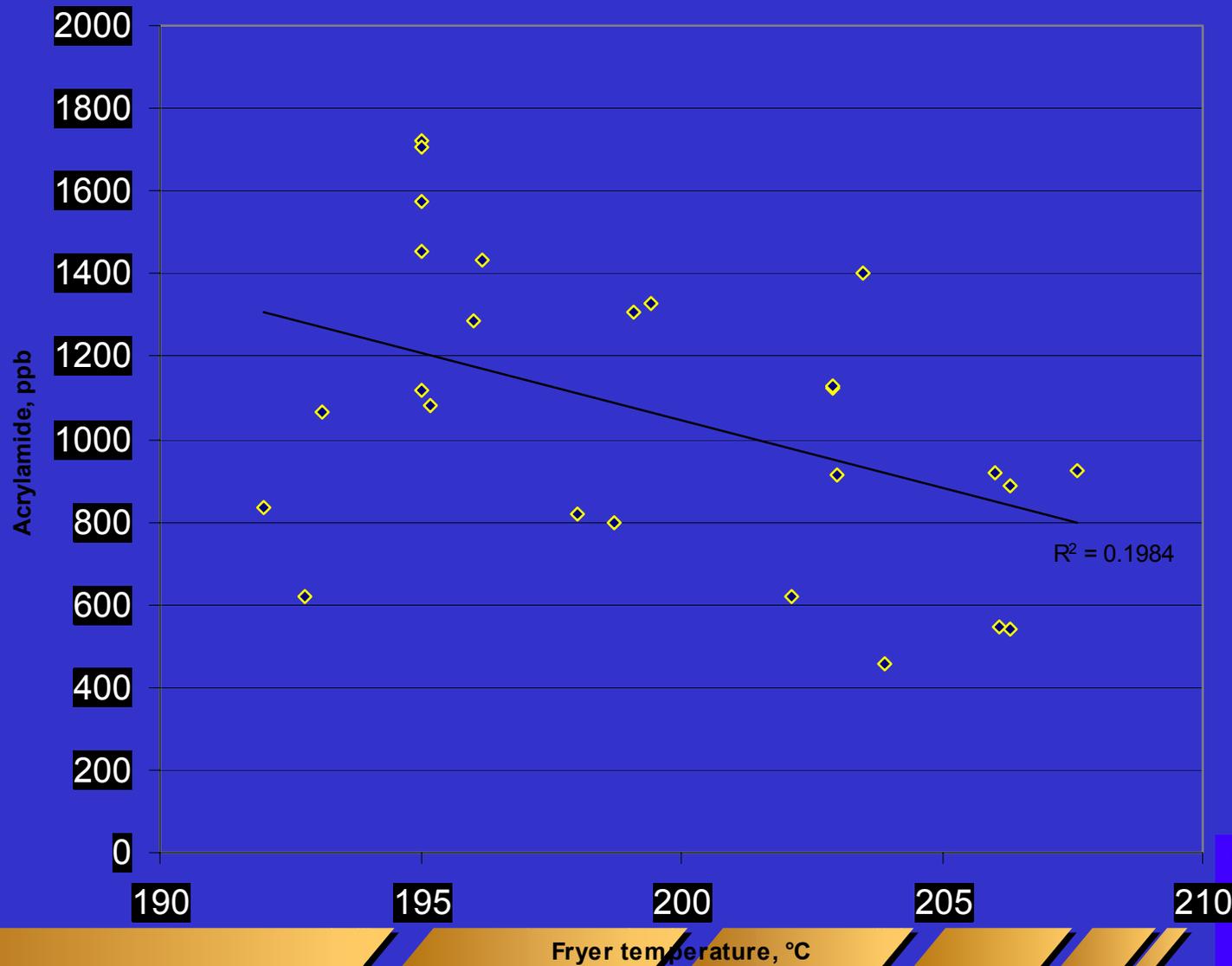
# *Home cooking illustrates the complexity*

- Home cooking shows both effects from the variability in starting materials and cooking
- Examples of home prepared foods
  - Grilled Onions, 56 ppb
  - Roasted Asparagus, 143 ppb
  - Baked Sweetpotatoes, 36-132 ppb
  - Gravy, 72-181 ppb

# *Acrylamide in Toasted Bread*

	White	Wheat	Raisin
Untoasted	19	76	12
Very light	38	48	21
Light	65	215	11
Medium	87	470	48
Very Dark	272	332	227

## Fried Snack Production Samples: Acrylamide Level vs. Fryer Temperature



# *New Information to be Discovered*

- Time/Temperature Relationship
- Data suggests that it's both
- For some foods, undercooking can lead to food poisoning
- Mandated maximum cooking temperatures in the absence of additional information is dangerous and unwarranted



Term	Definition	Example
Constitutive naturally occurring substances	Substances synthesized by physiological and biochemical processes present in food organisms themselves	Furanocoumarins, isoflavanoids, phytoalexins, cutins, alkaloids
Derived naturally occurring chemicals	Substances formed as a result of the breakdown of constitutive chemicals during stress, storage, processing, and preparation of foods	Polycyclic hydrocarbons, pyrazines, and heterocyclic amines that provide characteristic flavor or roasted and cooked foods—coffee, chocolate, nuts, meats, and browning products that add color and flavor to foods, such as toast and tawny port wine



Acquired naturally occurring chemicals	Substances present by infection or spoilage caused by bacteria or fungi or passively acquired from the environment	Aflatoxin B1 or botulism toxin, as well as chemicals such as residues of persistent pesticides no longer used but remaining in the soil.
Pass-through naturally occurring chemicals	Materials present in animal products consumed by humans that are derived from food eaten by an animal	Any seafood toxins sometimes present in shellfish, toxol in snakeroot, or aflatoxin, which can appear in cow's milk, or arsenic (a carcinogenic, toxic metal found naturally in seawater and marine microorganisms), assimilated by shrimp from consumed zooplankton.
Added naturally occurring chemicals	Constitutive or derived naturally occurring substances that are isolated from raw or traditionally processed plant or animal sources then added to the same or other foods	Sucrose, glucose, isolated soy protein used in infant formulas, flavors extracted from or distilled from spices, numerous gums and starches (e.g., corn or tapioca starch) that, because of specific functional characteristics, are used in other food