



Possible Anti-cancer Effect of Berries: What Is Apoptosis?



Centers for Disease Control and Prevention and
National Cancer Institute
(click on image)

Spoon yourself some health!
Eating more colorful whole foods *really* matters!



Strawberries (*Fragaria vesca*), among the world's
most popular foods

Apoptosis

- pronounced "eh-poh-toe-sis"
- defined as the natural rate of cells dying off, like the normal turnover of intestinal bacteria or skin cells
- if accelerated by a drug or natural compound acting specifically on cancer cells, an increased rate of apoptosis would be favorable for causing cancer cells to die faster
- apoptosis research on cancer cells is actively being explored using different berry



Blueberries (*Vaccinium corymbosum* L.) contain polyphenols that (in lab experiments) stimulate cancer cells to increase their rate of apoptosis

Strange facts about apoptosis

- responsible for small changes in membrane structure of all cells
- involved in natural disposal of cell debris
- different from **necrosis** which is a form of cell death resulting from acute cell injury
- apoptosis confers advantages during an organism's life cycle (except in the case of cancer cells)
- example, differentiation of fingers and toes in a developing fetus occurs because cells between the fingers *apoptose*; the result is that the digits separate
- between 50 billion and 70 billion cells die each day due to apoptosis in the average human adult
- for an average child between the ages of 8 and 14, approximately 20 billion to 30 billion cells die a day
- in a year, this amounts to loss of a mass of cells from apoptosis mechanisms equal to an individual's total body weight

What berry compounds may do

to stimulate apoptosis in cancer cells

- induce apoptosis via several biochemical pathways
- alter gene expression
- decrease tumor initiation, promotion, and progression signals
- produce anti-inflammatory activity through modulation of enzymes (inflammation mechanisms may be part of how cancer starts)
- induce apoptosis in immune cells made dysfunctional by nearby cancer cells



Red and black raspberries (here, *Rubus idaeus*) induce apoptosis of cancer cells in lab experiments

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