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抗癌及健康飲食

謝聖怡醫師

臺中榮總 胸腔外科

飲食與癌症

飲食**致癌**? **治癌**?

自己做自己的醫生

癌症 (CANCER) 字源於拉丁字蟹 (CANCRI)

-像慢性病，致病因素是經年累積的細胞叛變

- 遺傳因子
- 抽煙
- 不當飲酒
- 不當飲食
- 環境污染

+

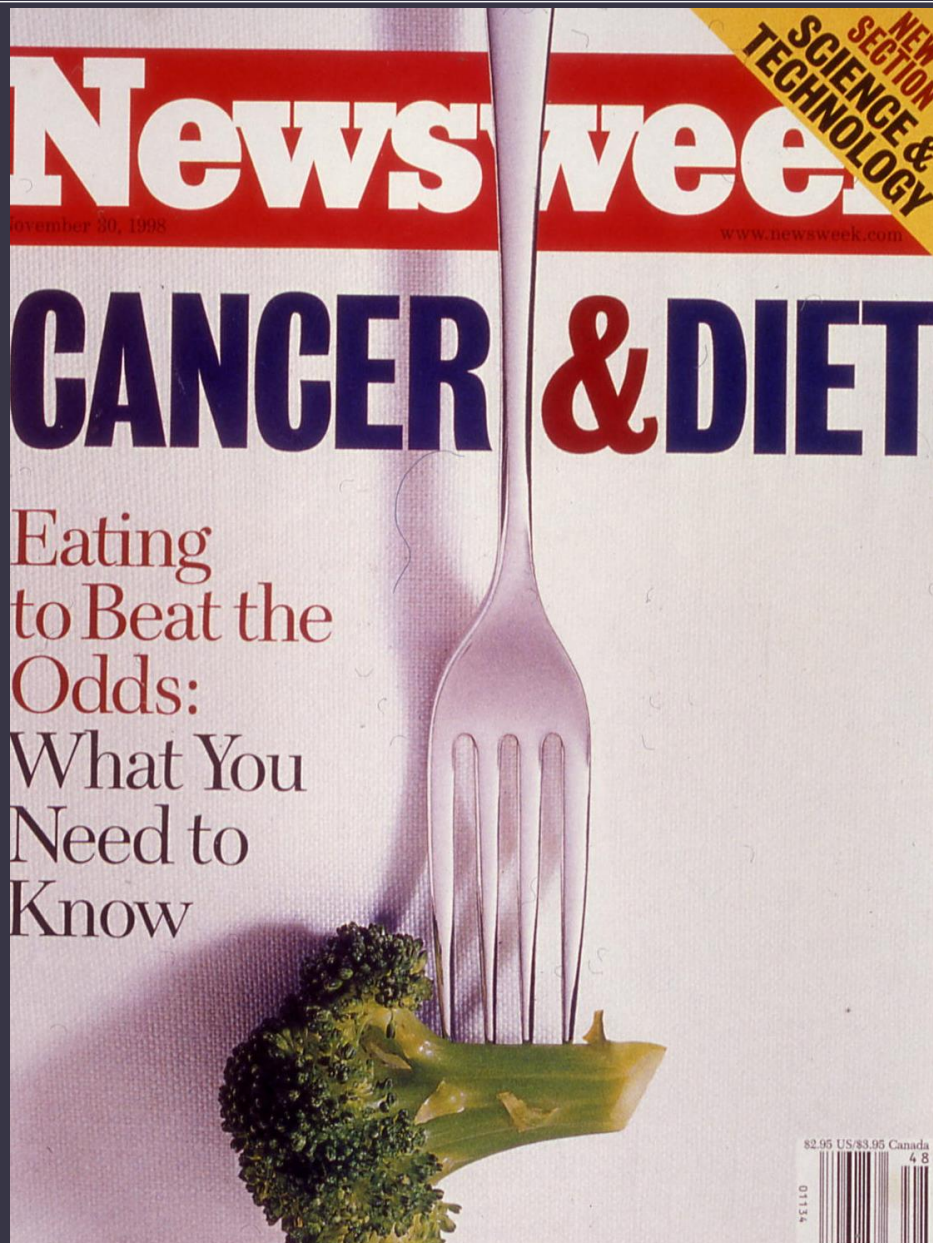
不正常生活形態
(壓力)



(身體的免疫或荷爾蒙變化)
提早引爆癌症的定時炸彈

精神壓力的負荷點數

事項	點數
1. 配偶去世	100
2. 離婚	73
3. 分居	66
4. 作牢	63
5. 家人去世	62
6. 車禍或生大病	53
7. 結婚	50
8. 被革職	47
9. 退休	45
10. 懷孕或生小孩	40
11. 性的問題	39
12. 財產的變化	38
13. 戀愛或失戀	35
14. 兒女離家	29
15. 換職位	29
16. 傑出成就	28
17. 搬家或轉學	20
18. 睡眠問題	16
19. 假期	13
20. 拿到違紀罰單	10



人生樂趣—中國人的哲學

- 美食激勵人生
- 食無止盡
- 我吃故我在

人類對食物需求的三個層次

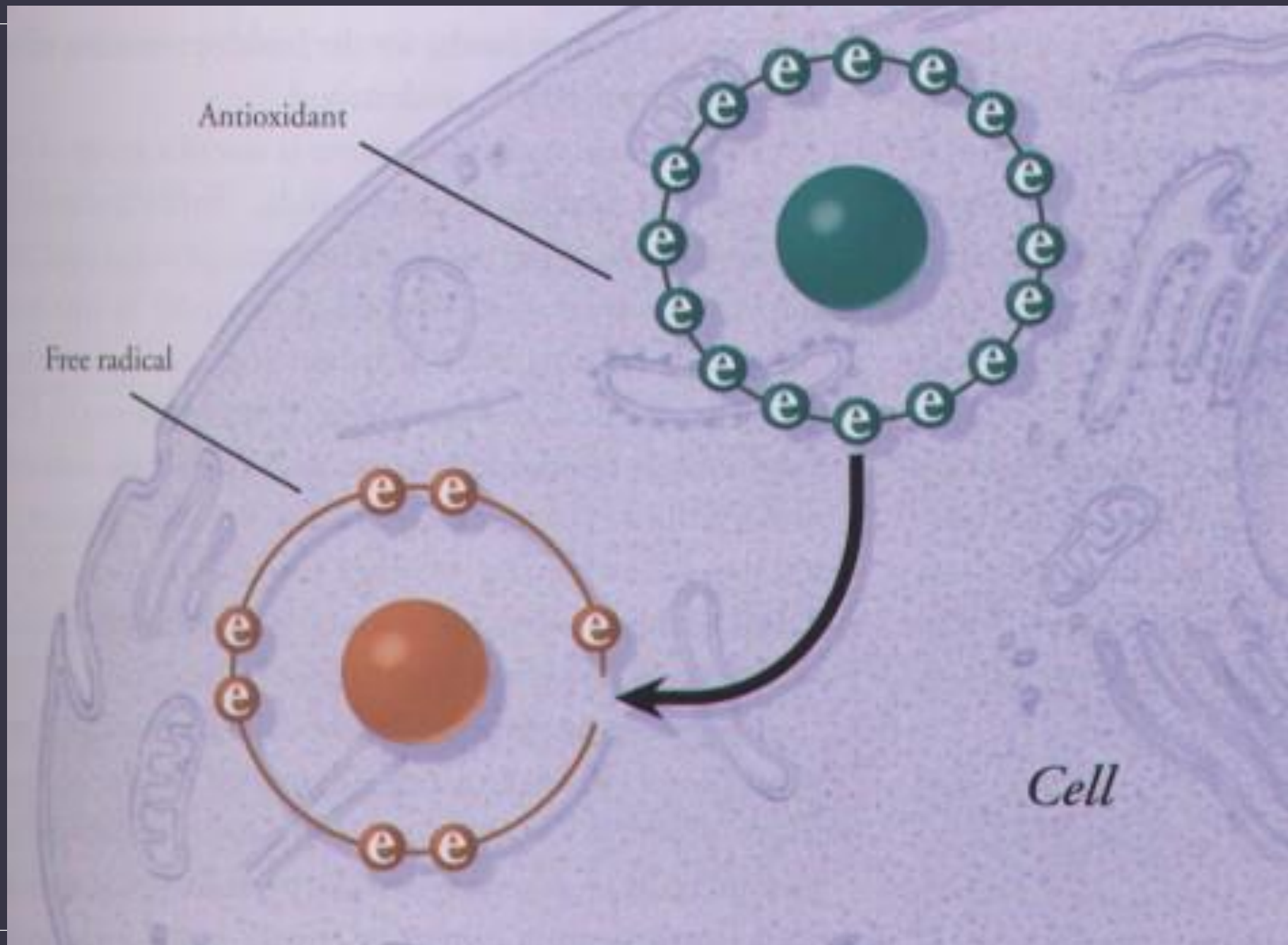
吃得飽（療饑止餓）

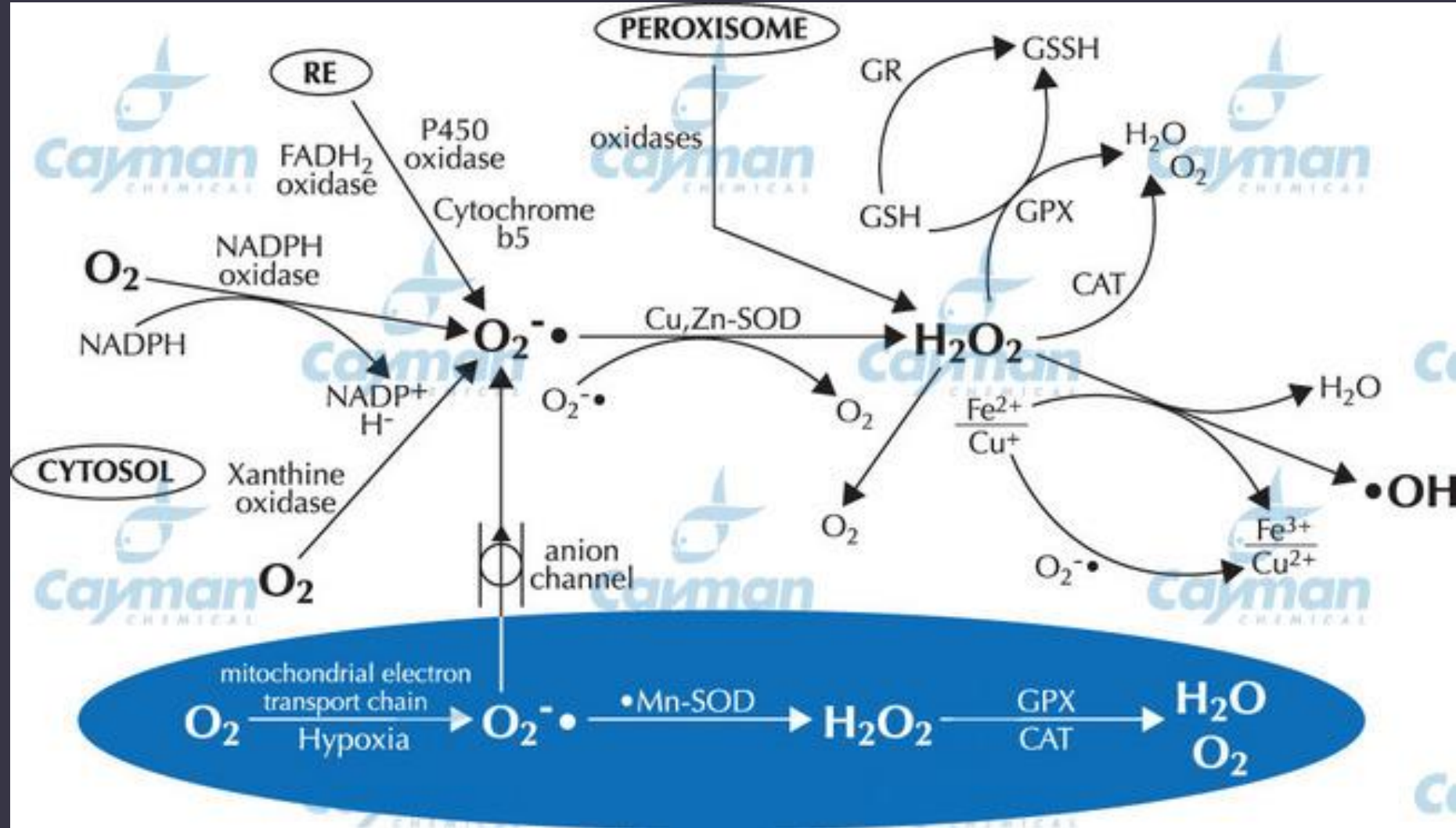


吃得好（精緻美味）



吃得對（吃出健康）

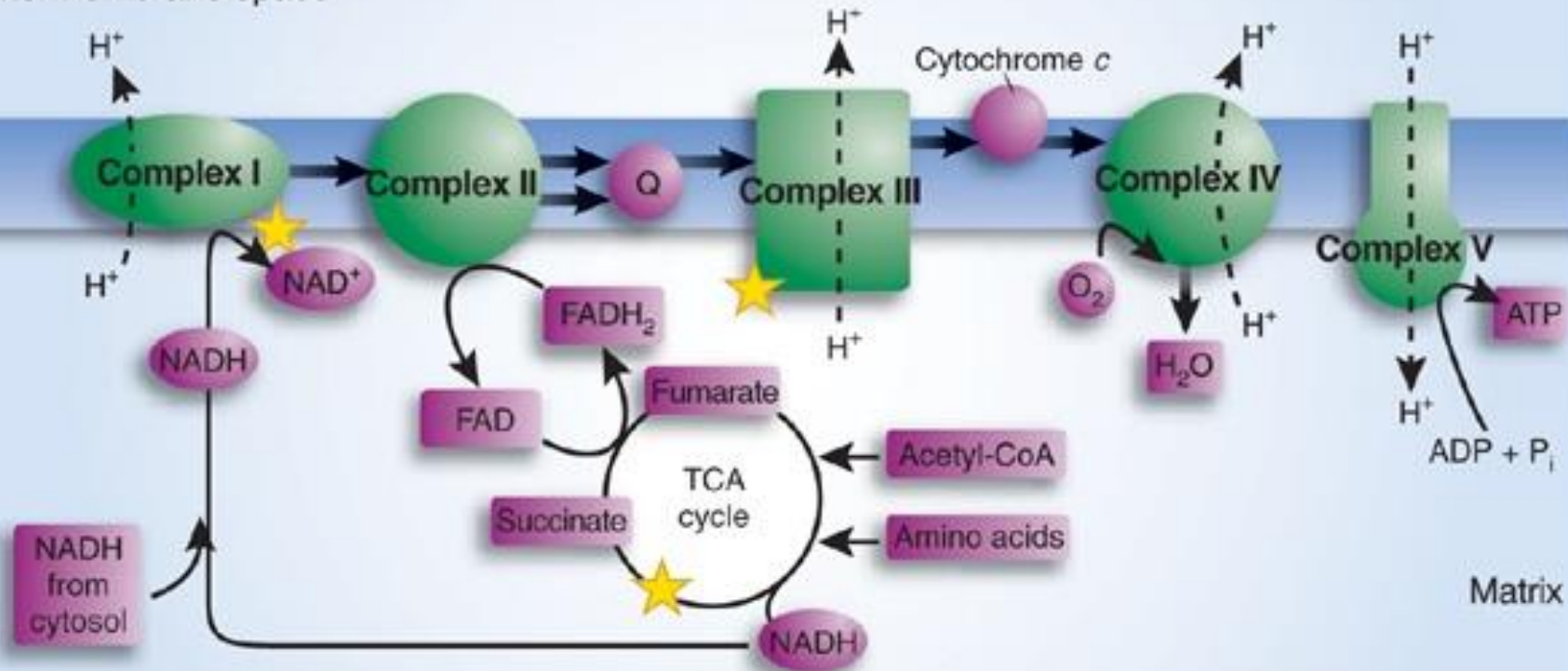




Cytosol

Outer membrane

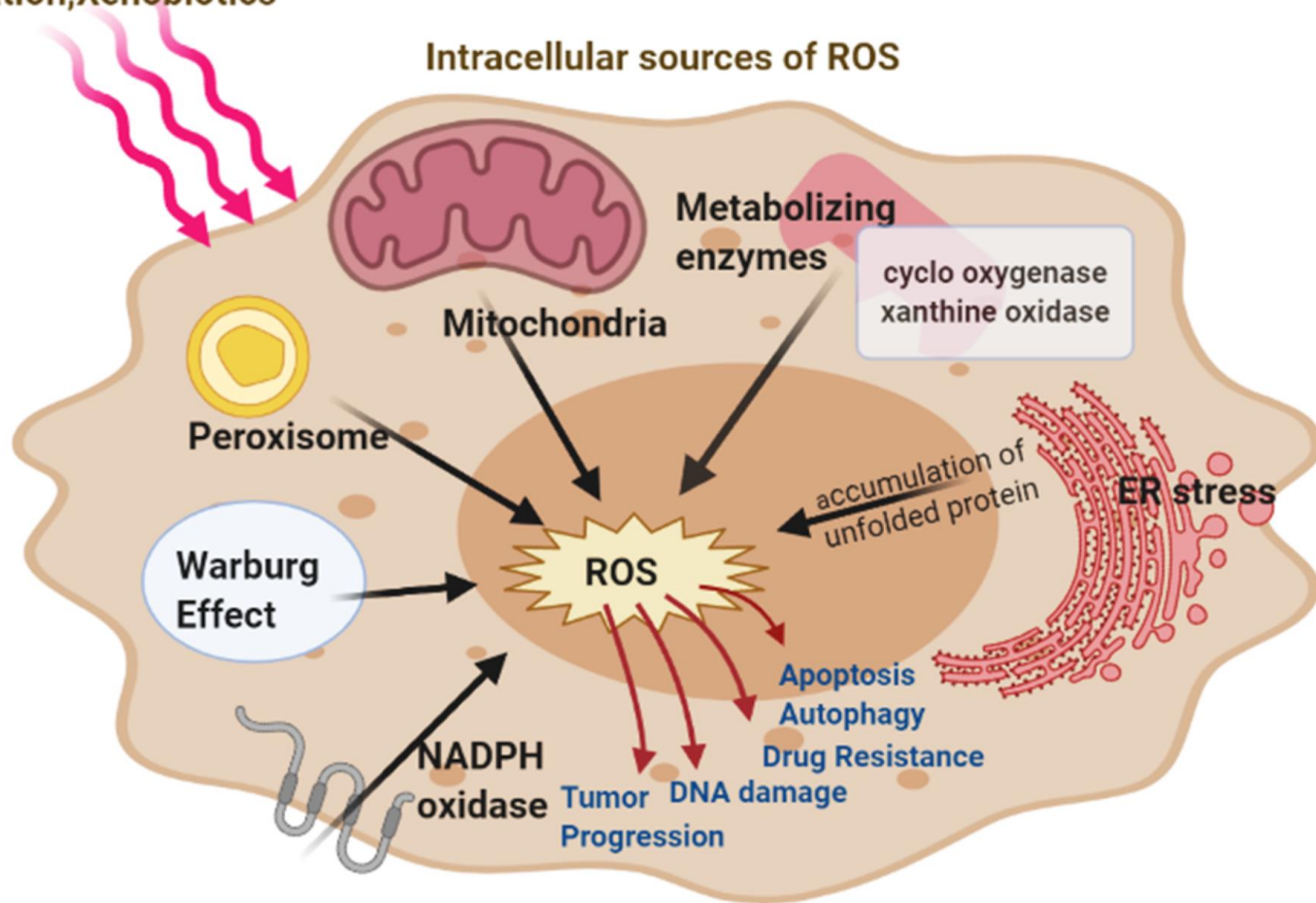
Intermembrane space

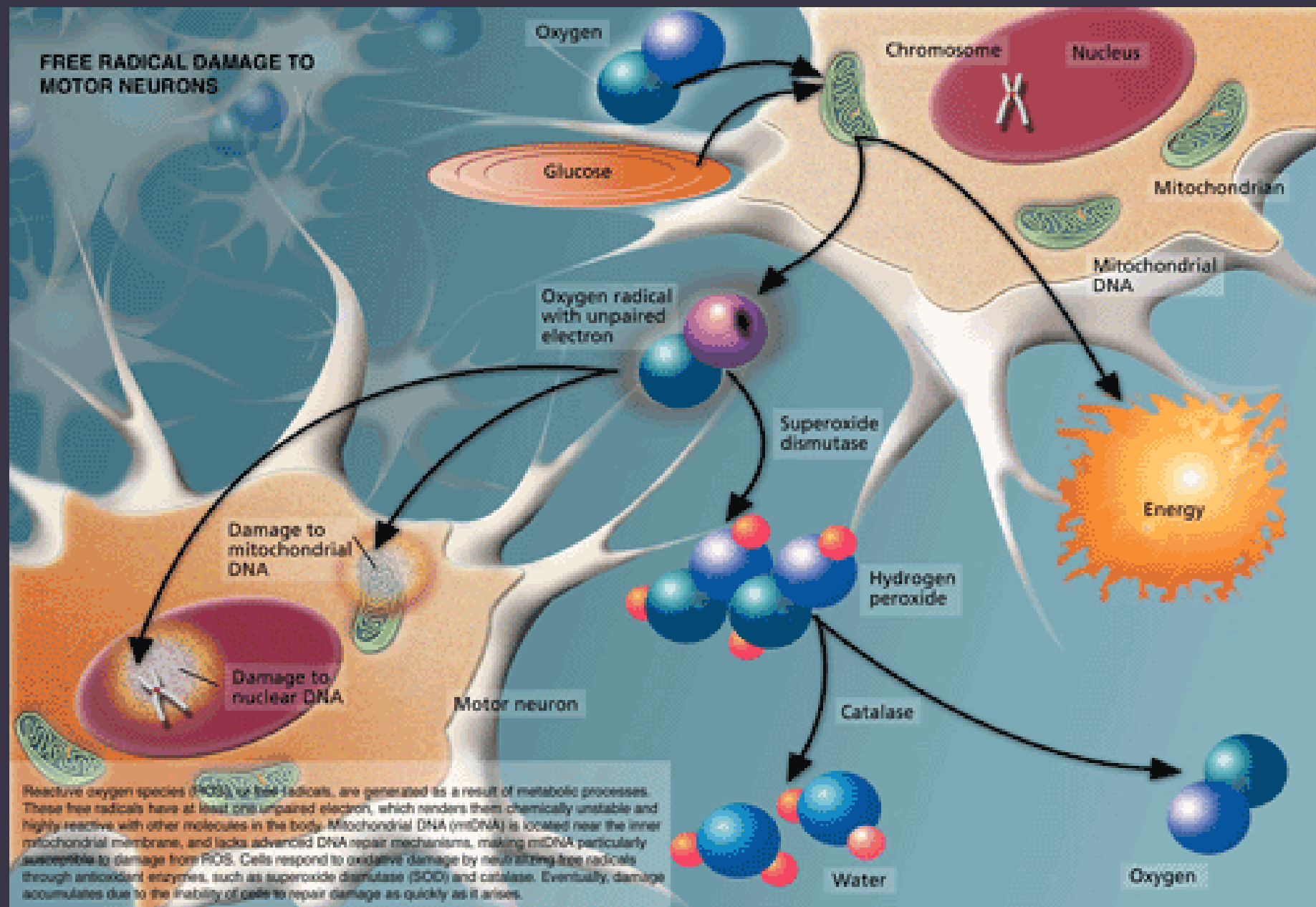


★ Sites of O₂ generation in mitochondria matrix



Extracellular sources of ROS-
Radiation, Xenobiotics





FREE RADICALS (CELLULAR INJURY OF DEATH)

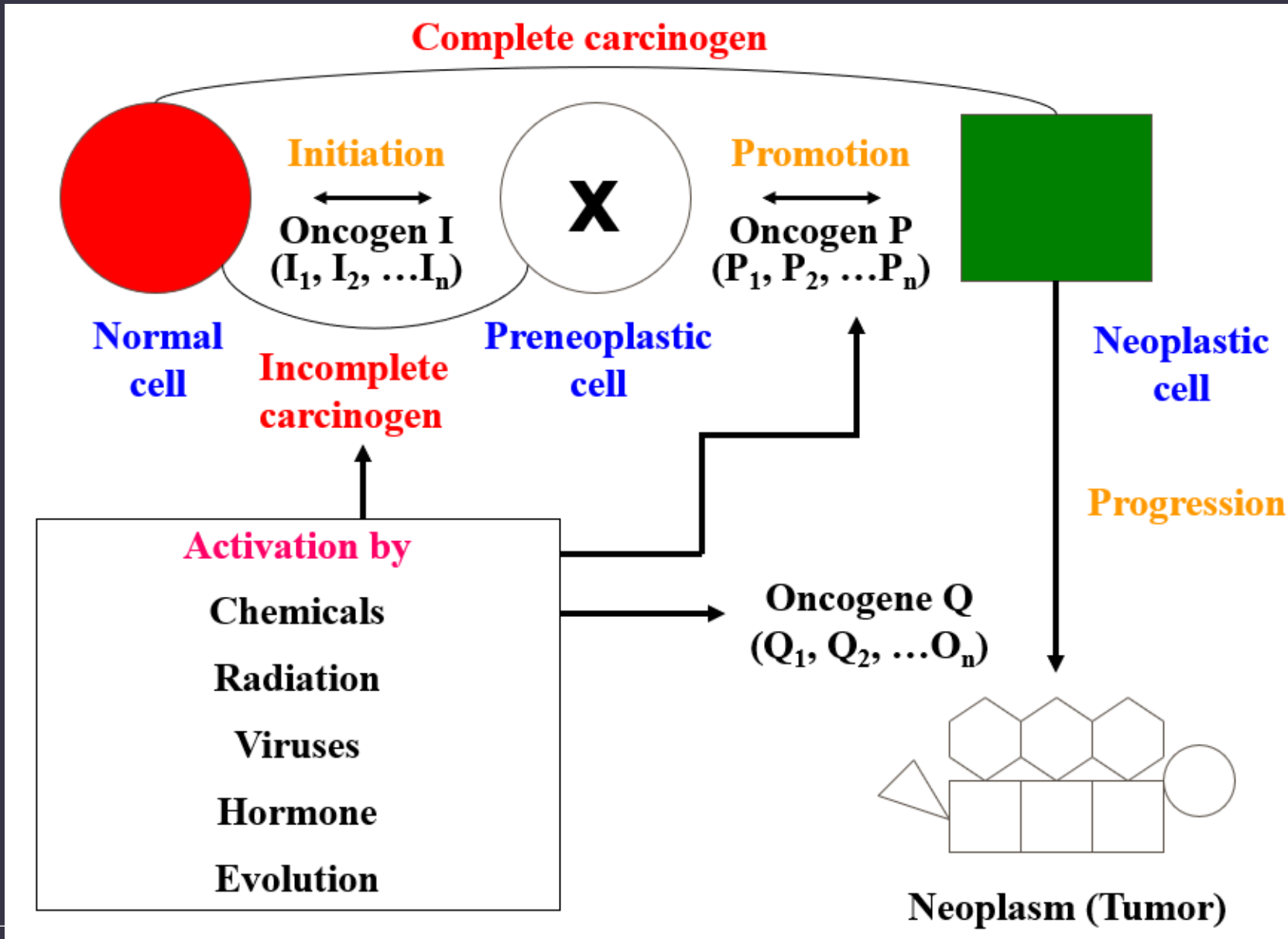
- **Caused by**
 1. Radiation and chemical injury
 2. Cellular aging
 3. Microbial killing by phagocytic cells
 4. Inflammatory damage
 5. Tumor destruction by macrophages
- **Rid by**
 1. **Antioxidant nutrients**
 - ❑ B-carotene, vitC and E, selenium, flavonoids
 2. **Antioxidant enzymes**
 - ❑ Glutathione peroxidase (**GSH**), superoxidase dismutase (**SOD**), **Catalase**

癌症的產生及擴展

- 致癌基因 (oncogene-**ras**, **myc** ...) 的活化：致癌性化合物，致癌性病毒、細菌、寄生物、放射性物質…。(敵人↑)
致癌物代謝活化 > 代謝去毒 (在P450系統)
- 抑癌基因 (tumor suppress gene-**P53**, **P21** ...) 的崩潰。(防禦↓)

二大關卡同時失守 → cancer 產生

致癌基因之活化與致癌作用



食物含有的致癌物質

	致癌物質	含有的食品
食物本身含有的 基因改造食物?	蘇鐵素 (cycasin) 黃樟素(safrole) 生物鹼 胼類化合物 (hydrazine) 咖啡酸	鐵樹 羅勒、肉荳蔻籽 落的嫩芽、款冬 蘑菇 咖啡
在特別條件下產生的	黃麴毒素 (aflatoxin) 亞硝胺 (nitroamines) 複環胺 (heterocyclic amines) 苯吡 (benzopyrine)	長霉的花生、玉米 (保存方法) 火腿、培根、飲水、蔬菜 (食物備製) 燒焦的魚、肉 (食物烹調) 燻製 油炸的魚、肉 (食物備製)
含在食品添加物中的	防霉劑 合成氧化防止劑 (BHA) 合成色素 人工調味料 殺菌漂白劑	柳橙、檸檬等 油脂、奶油等 糕點、果醬等 糖精 硼砂 雙氧水

農藥 (有機氯、有機磷)、化肥、除草劑(dioxin)、抗生素、荷爾蒙、生長素
防腐劑、重金屬...

黃麴毒素污染植物油 (抽取與處理方法的影響)

- 花生

- 未精製花生油含- 500 ppb ↑
- 發霉花生 (5500 ppb) → 粗油 (812 ppb) (壓榨法) → 精製後 (稀鹼+泥土) < 1 ppb

- 玉米

- 玉米粉 (425 ppb)
 - 正己烷溶媒 → 8 bppb
 - 氯仿溶媒 → 135 ppb
- 榨過油殘渣 (含高量毒素) → 餵動物一體內肌肉或奶汁毒素↑

亞硝基致癌物

- 天然產生

- 硝酸鹽 (植物中大量含有 $\xrightarrow[\text{clostridia}]{\text{Ecoli (腸管)}}$ 還原成亞硝酸鹽)
- 人類唾液含有相當多量亞硝酸鹽 $\xrightarrow[\text{酸性環境}]{\text{胃}}$ 亞硝化進行

- 人工添加

- 硝酸鹽與亞硝酸鹽 $\rightarrow$ 魚類及肉類食物保藏 (醃漬)
- 亞硝酸鹽
 - 抑制肉毒桿菌及其他細菌(防腐劑)
 - 肉類食品保持鮮紅顏色產生特殊風味

亞硝酸鹽 + 胺 $\longrightarrow$ 亞硝酸胺(致癌物) $\Longrightarrow$ 消化道癌症)

$\uparrow$
(vit C & E 可阻斷此反應)

吃烤魚、烤海鮮、烤肉滴上檸檬汁是有保護作用



帶飯蔬菜點揀好？

適合帶飯 ✓

亞硝酸鹽含量：370mg/kg或以下



蜜糖豆



豆角



雞髀菇



金針菇



節瓜



南瓜



翠玉瓜



冬瓜

不適合帶飯 ✗

亞硝酸鹽含量：3500mg/kg或以下



莧菜



小棠菜



白菜



菠菜



西生菜



菜心



油麥菜



芥菜

Meat-cooking and cancer

Cooking meat at high temperatures creates chemicals that are not present in uncooked meats. **Heterocyclic amines (HCAs)** are chemicals linked to cancer that are formed when meat is exposed to high temperatures. Four factors influence HCA formation:

Type of food

HCA is found in cooked muscle meats.

Other protein sources (milk, eggs, tofu, and organ meats such as liver) have little or no HCA naturally or when cooked.

Temperature

Cooking temperature is the most important factor in reducing the formation of HCA. Cooking in an oven at **400° Fahrenheit** or less; or stewing, boiling, or poaching at **212° Fahrenheit** or less forms one-third of HCAs versus meats prepared by frying, broiling, or grilling.

Cooking method

Frying, broiling, and barbecuing produce the largest amounts of HCA—these methods have higher than recommended cooking temperatures. Microwaving meats for 2 minutes helps to decrease HCA. **Meats that are microwaved before frying, broiling, or grilling have a 90 percent decrease in HCA content.** Marinating meats before cooking also inhibits the production of HCA.

Time

Meats cooked well done (no pink remaining in center) have more HCA than those cooked medium.

Pressure cooking and steaming is better

Carbohydrates and cancer

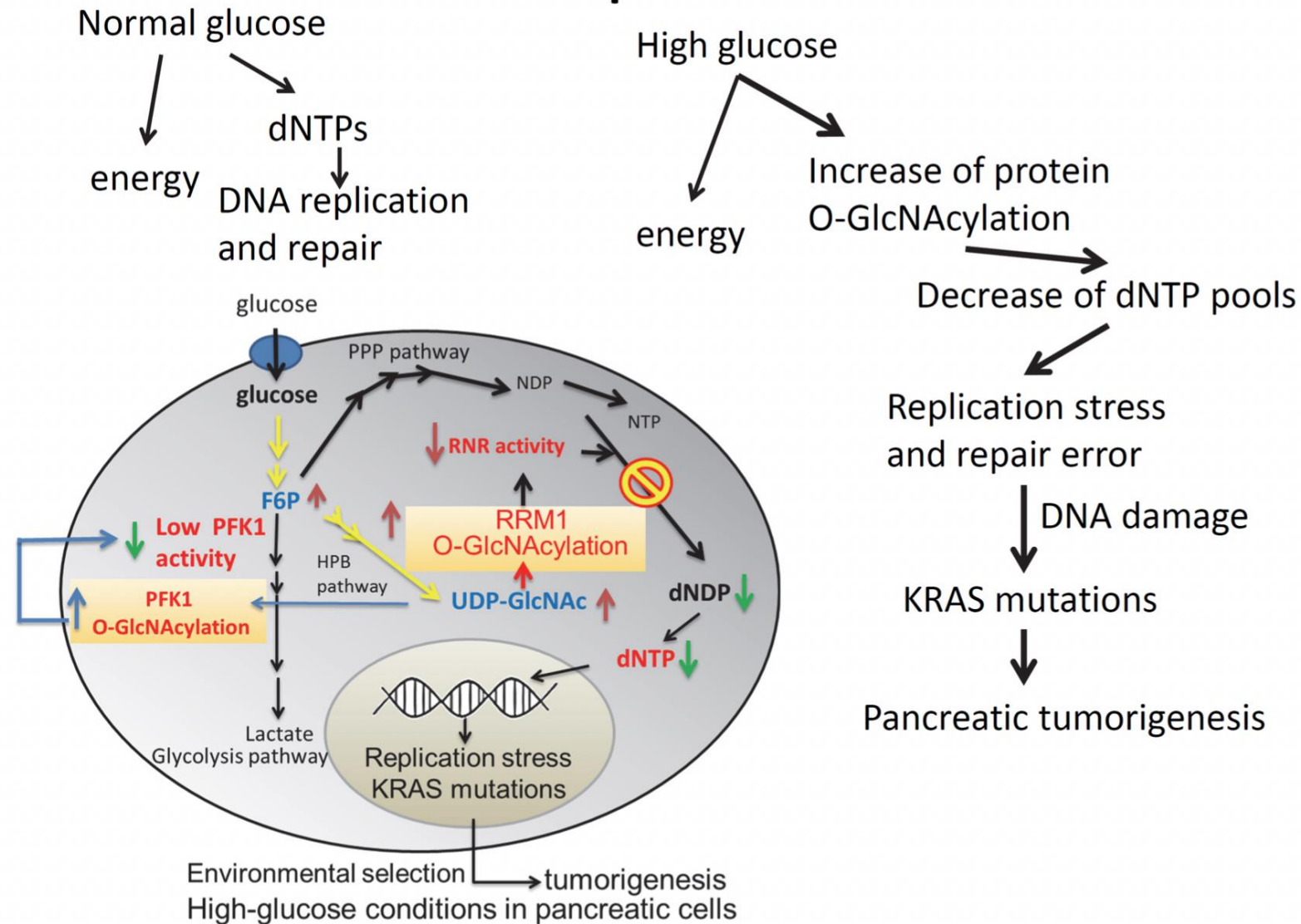
- Cancer cells in a tumor like to eat **glucose** and will alter the metabolism of the body to get more.
- A diet in which most of the calories came from **unrefined carbohydrates** is also rich in many other nutrients that can **inhibit the growth of cancer cells**.



Sugar and cancer: What's the link?

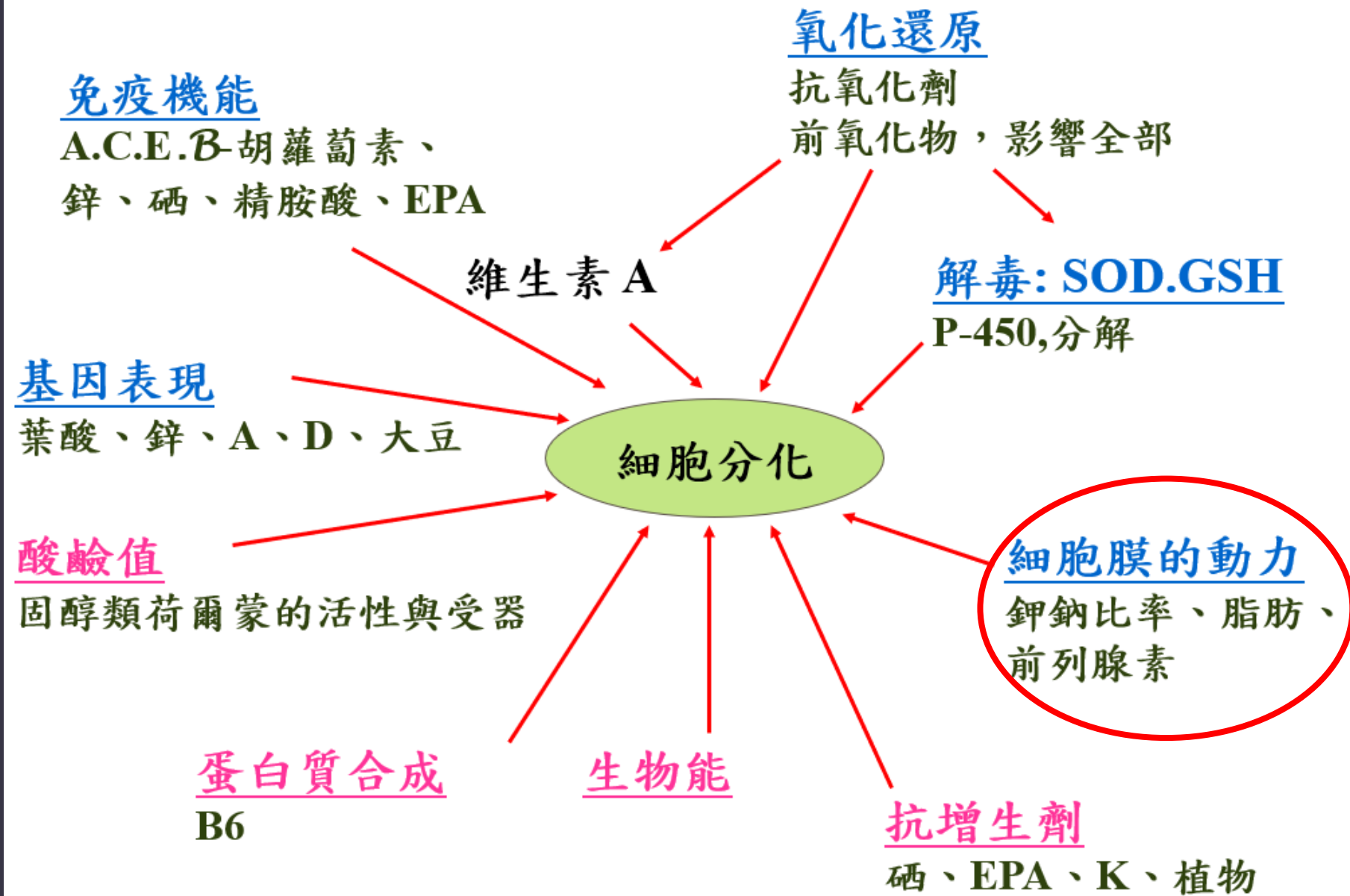
~~Cancer~~[®]
#EndCancer

Proposed model of high-glucose-treatment-induced KRAS mutations in pancreatic cells

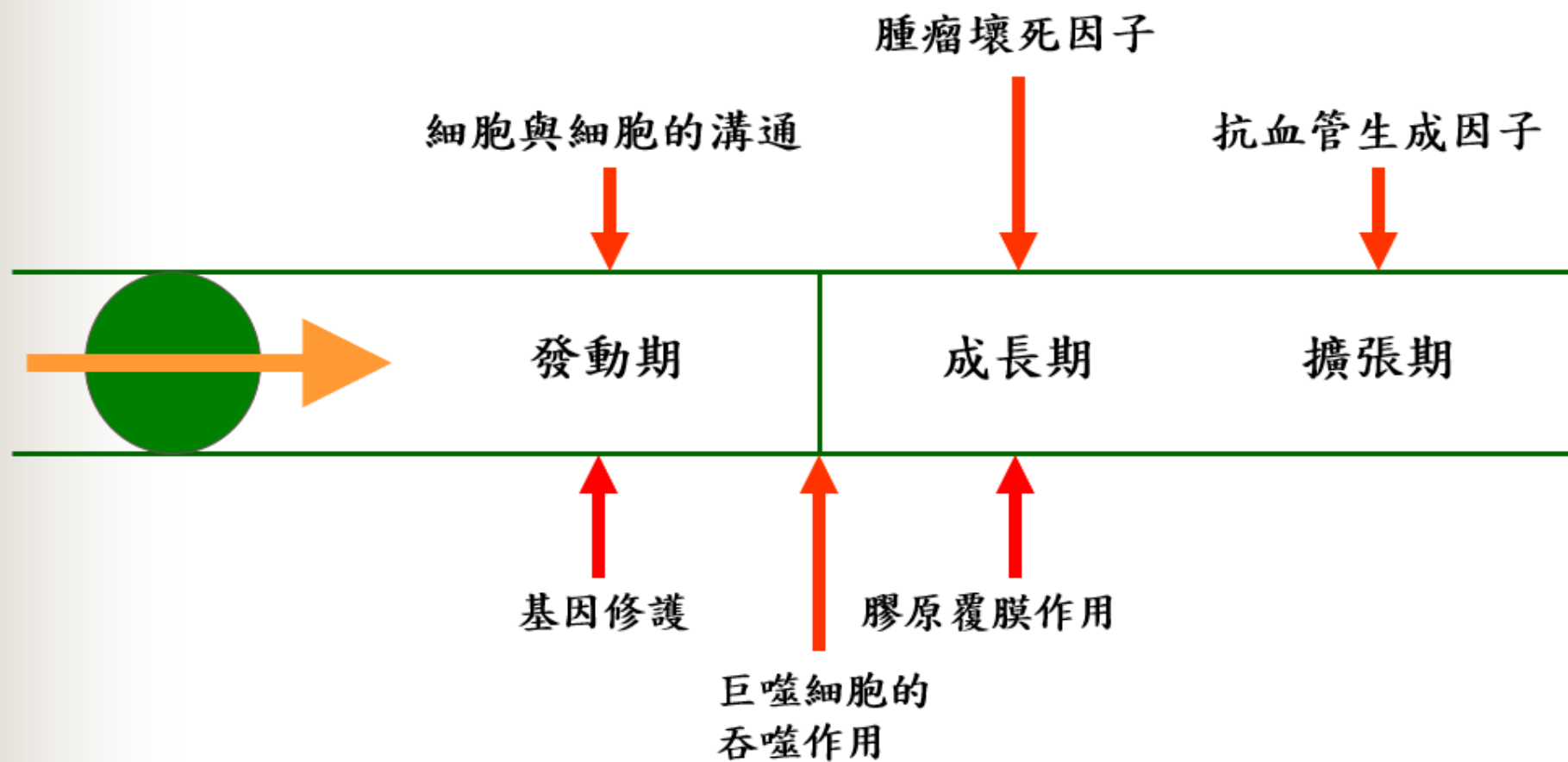


Cancer and lipids

- Too much fat in the diet is linked with increased tumor growth: fats inhibiting the immune system, stimulating the multiplication and spread of cancer cells.
- Linolenic acid (**omega-6** fatty acid): PGE_2 precursor **PGE_2** reduces the ability of macrophage and natural killer (NK) cells to kill cancer cells and tumor.
- Linolenic acid (**omega-3** fatty acid): **PGE_1** $\implies$ **PGE_2** ↓



營養素可以逆轉癌症的過程嗎？



植物性化學成分 (phytochemicals)

抑制癌細胞成長的機制

- 提高人體免疫力
- 誘導癌細胞走向良性分化
- 抑制癌血管新生
- 促進癌細胞走向凋亡
- 抗氧化 (或抗自由基) 的作用
- 抑制癌細胞訊號傳遞
- 植物類雌激素之拮抗作用
- 膳食纖維降低腸道致癌物對人體的影響

Food sources of antioxidants

Carotenoids

Beta-carotene—carrot, broccoli, sweet potatoes, greens (dandelion, turnip, beet, spinach), squash (butternut, Hubbard), red bell peppers, apricots, cantaloupe, mango

Alpha-carotene—greens (see above), corn, green peppers, potatoes, apples, plums, tomatoes

Lycopene—tomatoes, watermelon, pink grapefruit

Vitamin C

Bell peppers (red and green), guavas, greens (see above), broccoli, Brussels sprouts, cauliflower, strawberries, papayas, oranges and grapefruits and their juices

Vitamin E

Polyunsaturated vegetable oils, seeds, nuts, fortified cereals, greens (see above), tomato products

Selenium

Wheat germ, Brazil nuts, whole-wheat bread, bran, oats, turnips, brown rice, orange juice

Phytochemicals (1)

A food pharmacy that may fight disease

Phytochemical	Food	Potential benefit
Allyl sulfides 甲基烯丙基硫醚 (有機硫化物)	Garlic, onions, leeks	May protect against coronary artery disease, abnormal blood clotting, cancer
Alpha-linoleic acid α -亞麻酸	Flaxseed, soybeans, walnuts	Decreases inflammation
Anthocyanosides 花青素	Eggplant, oranges, blueberries	May protect against cancer
Capsaicins 辣椒素	Chili peppers	Topical analgesic
Carotenoids 類胡蘿蔔素, including lycopene (番茄紅素), lutein (葉黃素)	Orange, red, yellow fruits; many vegetables, including tomatoes	May protect against coronary artery disease, macular degeneration, and cancer
Catechins 兒茶素	Tea (especially green tea)	May protect against cancer
Cellulose 纖維素(fiber)	Whole-wheat flour, bran, cruciferous and root vegetables, legumes (莢果), apples	May protect against colon cancer , coronary artery disease

Phytochemicals (2)

A food pharmacy that may fight disease

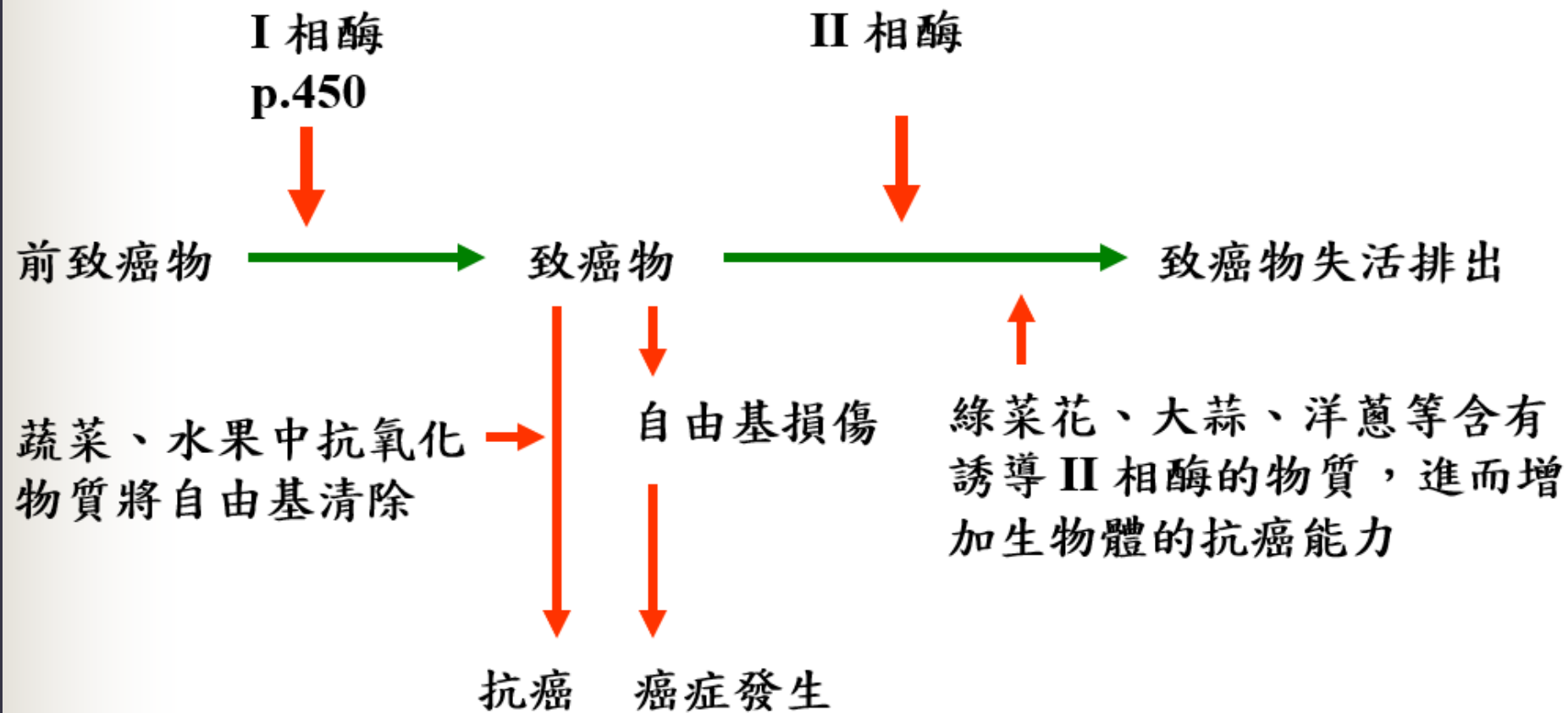
Phytochemical	Food	Potential benefit
Coumarins 香豆素	Carrots, citrus fruits (柑橘類), parsley	May protect against blood clots
Ellagic acid 鞣花酸	Strawberries, raspberries, blueberries	May protect against cancer
Flavonoids 類黃酮 (including resveratrol 白藜蘆醇)	Citrus fruits, onions, apples, grapes, wine, tea	May protect against cancer
Gums 膠 (fiber)	Oats, barley (大麥), legumes	May prevent colon cancer
Hemicellulose 半纖維素 (fiber)	Bran, whole grains	May prevent colon cancer
Indoles 吲哚	Cruciferous vegetables	May protect against cancer
Isoflavones 大豆異黃酮	Soybeans and soy products	May diminish menopausal symptoms; may protect against cancer, may lower blood lipid levels, may improve bone health

Phytochemicals (3)

A food pharmacy that may fight disease

Phytochemical	Food	Potential benefit
Isothiocyanates 異硫氰酸鹽	Cruciferous vegetables	May prevent lung, esophageal cancer
Lignins 木質素 (fiber)	Whole grains, oranges, pears, broccoli, flaxseed	May protect against cancer
Monoterpenes 單萜	Citrus fruits	May protect against cancer (pancreatic, breast, prostate tumors)
Pectin 果膠 (fiber)	Apples, citrus fruits, strawberries	May protect against cancer , coronary artery disease, diabetes
Phenolic acids 酚酸	Brown rice, green tea	May protect against cancer
Protease inhibitors 蛋白酶抑制劑	Soybeans , all plants	May protect against cancer
Phytosterols 植物固醇	Legumes, cucumbers	May help prevent coronary artery disease and breast cancer
Saponins 皂素	Garlic, onions, licorice, legumes	May protect against cancer

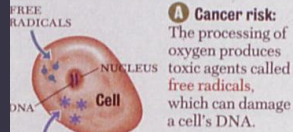
致癌物質與植物化學成份在癌症發生中的作用



How Foods Fight Cancer

The growth of a malignant tumor is a long, slow process that involves three key steps: the **initiation** of potentially cancerous changes in a cell's DNA, the **promotion** of uncontrolled growth in a damaged cell and the **progression** of a cancerous lesion into a mass that can invade other tissues. Preliminary evidence suggests that nutrients found in particular foods can interfere with each of these steps.

Step 1: Initiation



A Cancer risk: The processing of oxygen produces toxic agents called free radicals, which can damage a cell's DNA.

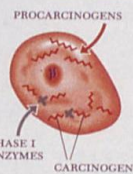
Food tip: Antioxidants, such as the polyphenols in green tea and the lycopene in tomatoes, help neutralize free radicals. Vitamins C, E and beta carotene are also good antioxidants.



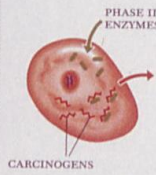
Tomatoes may help neutralize toxic agents that damage DNA

What does food have to do with all this? Quite a bit, by most estimates. "Humans eat two to three pounds of food into their bodies every day," says Koo. "It's our greatest contact with the environment." Population studies have consistently linked a high intake of plant foods to a low risk of cancer. And as molecular biologists have discovered during the past decade, the compounds contained in those foods can work in very specific ways to block the development of tumors. No one is holding up green tea and garlic as adequate treatments for advanced disease. The goal of the new prevention diets is to reduce the need for such treatments. As Gaynor puts it, eating the right foods is "as specific to stopping cancer before it starts as wearing a seat belt to lowering your risk of a fatal automobile accident."

NEWSWEEK NOVEMBER 30, 1998



B Cancer risk: Most cancer-causing chemicals enter the body as procarcinogens. In order to become full-fledged carcinogens, capable of damaging cellular DNA, they must first be broken down by phase I enzymes produced in the liver.



Food tip: Garlic contains chemicals called allyl sulfides, which help limit the production of phase I enzymes. In addition to phase I enzymes, the liver produces phase II enzymes to cart off the dangerous residue phase I's leave behind. Broccoli, cauliflower and other cruciferous vegetables are rich in a chemical called sulforaphane, which boosts production of phase II enzymes.

Fruits and vegetables are loaded with antioxidants. Vitamins C, E and beta carotene can all help neutralize the free radicals that degrade cellular DNA. They even help protect each other. C preventing oxidative damage to E, and E blocking the oxidation of beta carotene. But vitamins are just the beginning of the antioxidant story; researchers have recently identified several plant chemicals that may have far stronger effects. Grapes and red wine are rich in an antioxidant called resveratrol, which reduced the incidence of skin tumors in mice by 88 percent in one recent study. Green tea contains several potent antioxidant chemicals known as polyphenols. Researchers estimate that one of them, a compound called EGCG, has 20 times the radical-quenching effect of vitamin E, and 500 times the effect of vitamin C.

Then there's lycopene, the pigment that gives tomatoes their blush. You can't get much lycopene from a raw tomato; it's too tightly bound by the fruit's proteins and

Garlic helps limit the production of cancer-causing chemicals



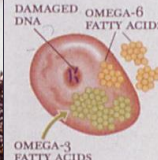
Broccoli contains chemicals that remove carcinogens from cells

fibers. But cooking frees it for absorption by the body, and dietary fat helps carry it into the bloodstream. If that's not reason enough to enjoy some tomato sauce with a dash of olive oil, consider this. In a 1995 study of 48,000 men, Harvard researchers found that those who ate 10 servings of tomato-rich foods every week cut their risk of prostate cancer by nearly half. Other studies suggest that lycopene may help ward off cancers of the breast, lung and digestive tract.

IF YOU DO MAKE TOMATO SAUCE, DON'T forget to add some garlic. Just as lycopene helps ward off oxidative damage, the allyl sulfides found in garlic, chives and onions may help the body process cancer-causing chemicals more safely. You'll recall that the liver's phase I

Step 2: Promotion

A Cancer risk: If the first-line defenses fail and a cell undergoes potentially cancerous changes, the body's best defense is to destroy it or, barring that, keep it from dividing rapidly. The omega-6 fatty acids that abound in corn oil and safflower oil seem to promote rapid cell division.



Food tip: The omega-3 fatty acids in flax and fatty fish may thwart tumor growth by crowding out other fats out of cells.

Flaxseed may lock bad fats out of cells

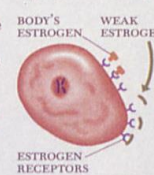


enzymes break down potential carcinogens as they enter the body, leaving them in a more reactive state until they're carted away by phase II enzymes. Allyl sulfides can modulate phase I activity, presumably reducing the volume of debris that our cells have to contend with. "Even modest amounts of garlic in the diet have a marked impact on metabolism," says nutritionist John Milner of Pennsylvania State University. You don't have to cook the clove to get the effect, but the allyl sulfides won't fully form unless you cut it up and let it sit for 10 minutes. Milner suggests buying aged garlic extract, which has shown the most potency in lab studies.

Garlic isn't the only food that could help you handle carcinogens more deftly. Just as garlic can dampen phase I activity, cruciferous vegetables such as broccoli, cauliflower and cabbage may boost production of the phase II enzymes that cart away chemical debris. The credit goes to sulforaphane, a sharp-tasting chemical that insects (and some humans) find repellent.

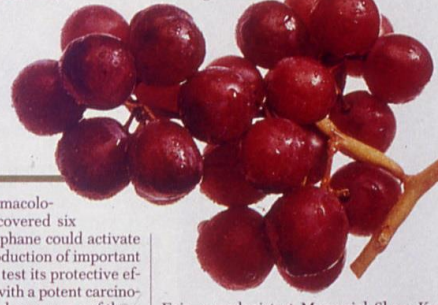


Soy may protect reproductive tissues



B Cancer risk: Reproductive tissues are particularly cancer-prone because they divide rapidly when triggered by the body's own sex hormones. Estrogen promotes fast growth of breast cells in women.

Food tip: Soy products contain chemicals called isoflavones, which act as weak estrogens and leave less room for strong ones.

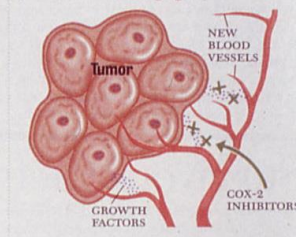


Johns Hopkins pharmacologist Paul Talalay discovered six years ago that sulforaphane could activate a gene that boosts production of important phase II enzymes. To test its protective effects he injected rats with a potent carcinogen called DMBA, and gave some of them sulforaphane as well. Tumors cropped up in 68 percent of the untreated animals, yet only 26 percent of those on high doses of sulforaphane got sick. Does that prove that broccoli prevents cancer in people? Of course not, but it provides a good excuse to munch some.

It also points to the need for seeking other safeguards. Suppose the green tea and red wine, the tomatoes, the garlic and the broccoli aren't enough to keep one of your cells from running amok. Could other foods affect the odds that a precancerous lesion will blossom into a tumor? Dietary fat may play an important role. Precancerous prostate lesions are equally common throughout the world, notes Dr. William

Step 3: Progression

Cancer risk: If all other defenses fail and a damaged cell spawns a tumor, the question is whether it will build itself a blood supply and invade surrounding tissues. Tumor cells release growth factors that promote the development of new blood vessels, a process known as angiogenesis.



Food tip: So-called cox-2 inhibitors, such as the resveratrol in red grapes and the curcumin in turmeric, may suppress the tumor's production of growth factors.

Red grapes may inhibit blood-vessel growth

Fair, a urologist at Memorial Sloan-Kettering. Autopsy studies find them in nearly a third of all men in their 30s. Yet advanced tumors are six times more common in the United States (where fat accounts for nearly 40 percent of calories than in Japan (where it accounts for less than 20 percent). Breast-cancer incidence follows a similar pattern. And lab studies have shown that tumor cells behave less aggressively in animals on low-fat diet than in those fed higher-fat fare.

But total fat intake is only part of the story. Many experts now agree that the type of fat you consume is as important as the amount. Saturated fat, for all the havoc it wreaks on the heart and blood vessels, doesn't seem to affect cancer risk one way

PHOTOS LEFT TO RIGHT: STEVEN NEZDHAM - ENVISION (6); DAVIES AND STARR - TONY STONE IMAGES; STEVEN NEZDHAM - ENVISION; MICHAEL KELLER - STOCK MARKET; STEVEN NEZDHAM - ENVISION (CELL & TUMOR GRAPHICS) NO CREDITS

NOVEMBER 30, 1998 NEWSWEEK 61

Tofu treatment (soy products)

- A cup of soybeans contains
 - twenty-eight grams of protein (half the RDA)
 - fiber
 - zinc
 - vitamin B
 - half a day's supply of iron
 - loads of highly absorbable calcium
- Inhibit breast cancer by decreasing the level of circulating estrogen, thereby blocking the cancer-promoting action of estrogen
- Many phytochemicals: phytoesters, saponins, genistein, daidzein, protease inhibitors.

生食療法與生機飲食之異同

項目	生食療法	生機飲食
綠汁	以小麥草汁為主	小麥草汁或麥苗粉或其他綠汁如蒲公英汁…
芽菜	以水耕為主	水耕或土耕
蔬菜	生食	生食或汆燙快煮
水果	生食	生食
堅果	生食或發酵	生食
豆類	發芽後生食	發芽後生食或熟食
穀類	發芽後生食	發芽後生食或熟食
發酵食品	以回春水為主	回春水、酸乳酪、天然醋、味噌、泡菜、酵母…等
油	從天然食物攝取不另添加	少油
鹽	從天然食物攝取不另添加	少鹽
糖	從天然食物攝取不另添加	少糖
生食比例	100%	視身體需要而定從10%~80%
適用對象	重症患者或喜好生食的保健人士	輕症患者或一般保健人士

味噌芽菜湯



味噌苜蓿湯



精力湯



回春水



蔬菜湯



抗癌蔬菜湯



營養精力湯



竹筴湯油黃蟹



High-Risk Dinner

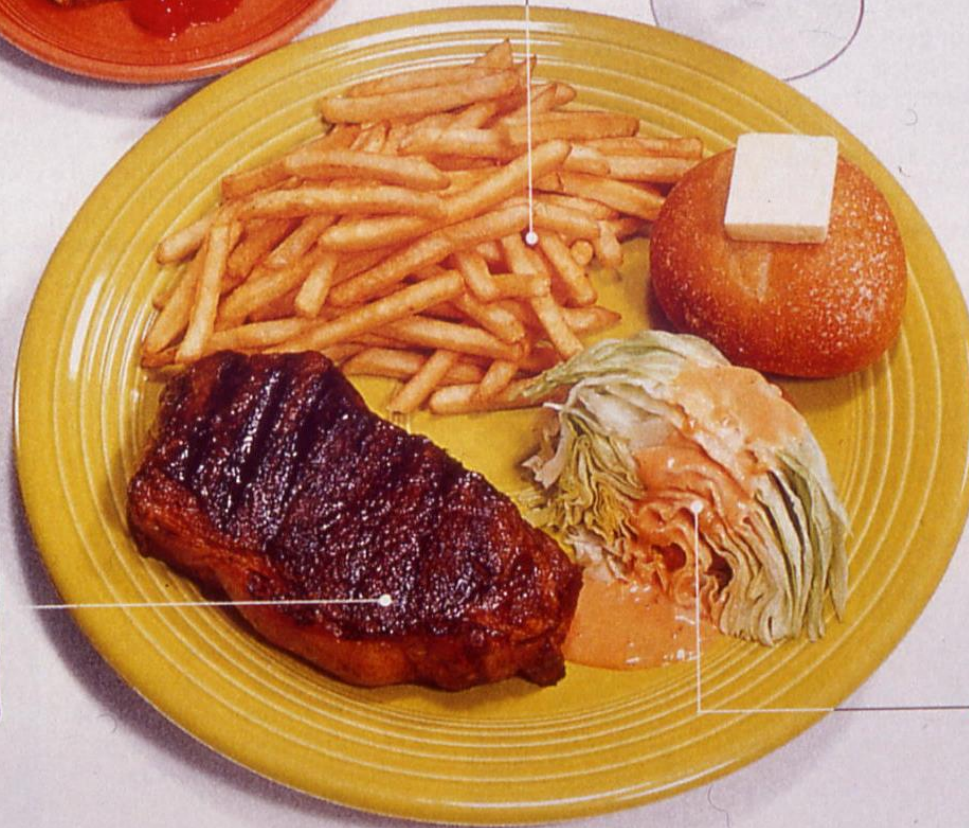
In nationwide studies, people who eat the fewest fruits and vegetables are roughly twice as likely to get cancer—from lung to colon—as those who consume the most. Cut the cheesecake.

Charred meat contains a hash of carcinogens; among them are compounds called **heterocyclic amines**.

Hold the fries. Experts suggest that to lower cancer risk, **fat** should constitute no more than 20 percent of total calories.

Soda is nothing but **empty calories**. Try green tea. It has no calories—and boasts cancer-fighting polyphenols.

Iceberg lettuce is a **nutritional weakling**. And drenching it in Thousand Island dressing loads you up with **fat**.



Low-Risk Dinner

It's no secret that a low-fat diet with lots of fresh fruits and vegetables can help prevent heart disease. Now scientists are showing that it may also protect against cancer. So your mother was right: eat your broccoli.

Not all fats are bad for you. The **omega-3** oils in tuna steak, salmon, mackerel and sardines appear to be protective.

The fiber in beans fights colon cancer. And the **genistein** in tofu appears to pack a disease-preventing wallop.

Though alcohol may promote cancer, the **resveratrol** in red wine and grape juice stems oxidative damage.

Crucifers like broccoli contain **sulforaphane**, which boosts key cancer-fighting enzymes.



健康飲食的五大基本特色



脂肪最怕的九種食物

- 涼拌黃瓜
- 生菜沙拉
- 蒜香花菜
- 水煮玉米
- 清炒豆芽
- 清炒蘑菇
- 番茄生吃
- 金針菇湯
- 冬瓜燉湯

謝謝聆聽

Q&A

- 目前有哪些科學證據顯示有助於對抗失智的健康飲食？
- 癌症病患胃口經常不佳，在這麼多可選的抗癌飲食中，有無具體可行的原則，以達最佳的效果？