

MIDDLE EAST AND LOW RATES OF CANCER

- BENEFITS OF FASTING, SPICES AND HEALTHY LIFESTYLE HABITS -

DR. ERIC BERG





CANCER IN NUMBERS

- After cardiovascular diseases, cancer is the 2nd leading cause of death worldwide.
- In 2018 there were 17.0 million new cancer cases and 9.5 million cancer deaths worldwide – according to the International Agency for Research on Cancer (IARC).
- By 2040, the global burden is expected to grow to 27.5 million new cancer cases (60%) and 16.3 million cancer deaths (70%).
- In males, most common cancers are lung, colorectal and prostate cancer.
- In females, most common cancers are breast, colorectal, cervical and uterine cancer.
- The future burden will be even larger due to increasing prevalence of risk factors such as unhealthy diet, physical inactivity, pollution, smoking, alcohol, stress, radiation and fewer childbirths, in economically transitioning countries.

MIDDLE EAST AND LOW RATES OF CANCER

- Average rates of cancer in the world per 100,000 people vs. rates of cancer on Middle East:

World	Middle East
198	137



- Cancer rates: Top 15 countries in the world vs. Middle East countries

World	Cancer rates per 100,000 people	Middle East	Cancer rates per 100,000 people
1. Australia	468	1. Israel	240
2. New Zealand	438	2. Turkey	175
3. Ireland	374	3. Egypt	160
4. Hungary	368	4. Lebanon	157
5. USA	352	5. Jordan	155
6. Belgium	346	6. Iran	153
7. France	344	7. Syria	149
8. Norway	338	8. Iraq	135
9. Netherlands	334	9. Kuwait	116
10. Canada	334	10. Bahrein	112
11. UK	319	11. UAE	107
12. South Korea	313	12. Qatar	107
13. Germany	313	13. Oman	104
14. Switzerland	311	14. Yemen	97
15. Serbia	308	15. Saudi Arabia	96

Source: <https://www.cancer.org/>

POSSIBLE REASONS FOR LOWER RATES OF CANCER ON THE MIDDLE EAST

1. Fasting (during Ramadan)
2. Increased consumption of healthy spices and foods with anti-cancer properties
3. Lower tobacco use among females
4. Prohibited alcohol use in some areas

ANTI-CANCER BENEFITS OF FASTING (RAMADAN)

- Evolution has selected for organisms (including humans) that are able to withstand starvation.
- We can survive for over a month on water alone.
- Fasting is one of the oldest therapies in medicine. For instance, Hippocrates believed that fasting enabled the body to heal itself.
- Fasting is also a part of most spiritual traditions in the world, including Christianity, Hinduism, Judaism, Buddhism, and Islam.
- Of all religions, Muslims practice fasting the most. They are also mandatory to fast during the holy month of Ramadan.

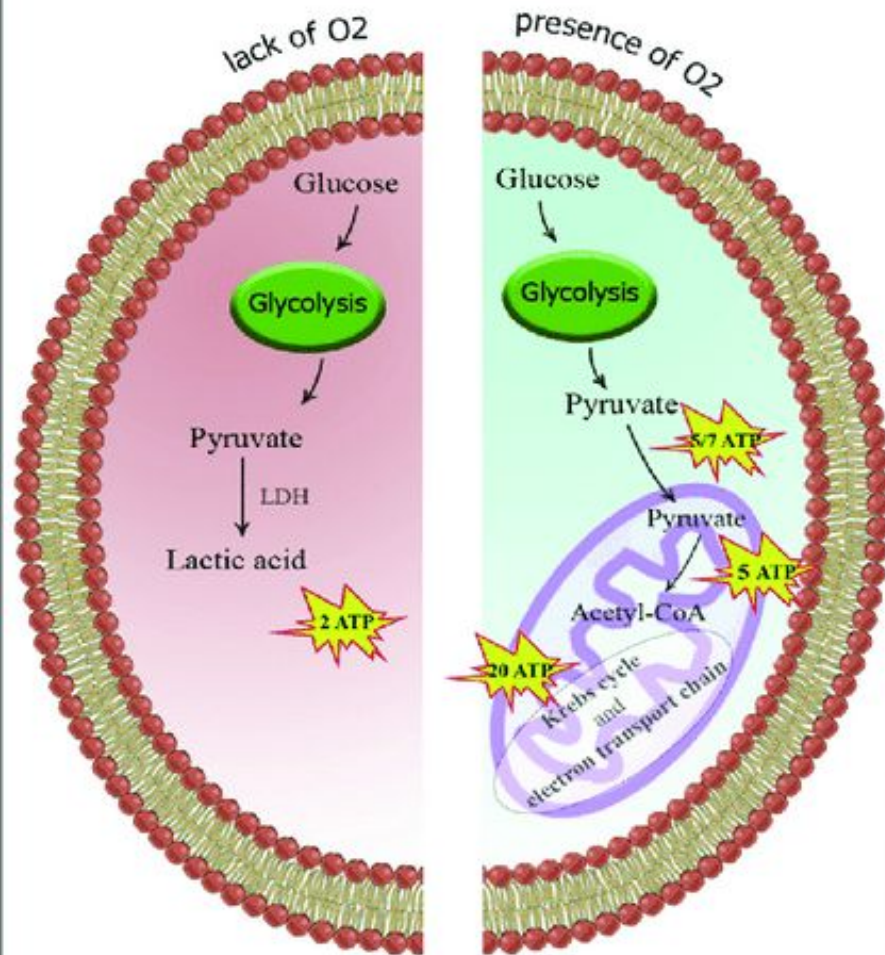
Anti-cancer mechanisms of fasting:

1. Blood sugar levels reduction – cancer starvation
2. Autophagy induction
3. Regeneration of new immune system cells
4. Positive effects on hormones
5. Anti-inflammatory and antioxidant effects

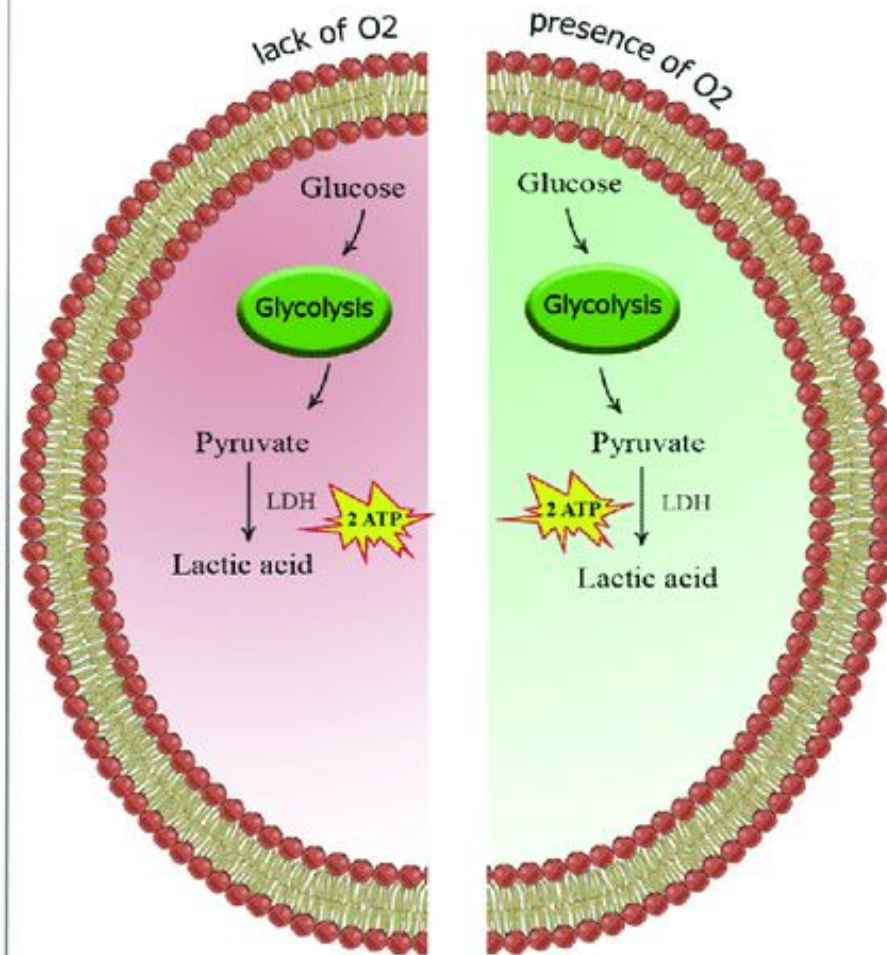
Mechanism 1: Blood sugar levels reduction

- Cancerous cells are avid for sugar because most of the fuel consumed by cancer cells is glucose (sugar).
- Cancer cells have 10-50X more insulin receptors than human cells.
- Cancer cells turn glucose into an excess of lactic acid through a process known as fermentation. Lactic acid is then used to stimulate the growth and spreading of tumors.
- In normal occasions, healthy cells never use fermentation to metabolize glucose. Normal cells break down glucose in the presence of oxygen to carbon dioxide and water through a process known as aerobic glycolysis.
- Fasting decreases blood glucose levels and starves cancer cells to death. Without enough fuel (glucose), cancer cells can't efficiently divide, grow and survive.
- Fasting does not negatively affect normal cells function, as normal cells can rely on ketones, whereas cancer cells can't efficiently use ketones as an energy source.

In normal cells

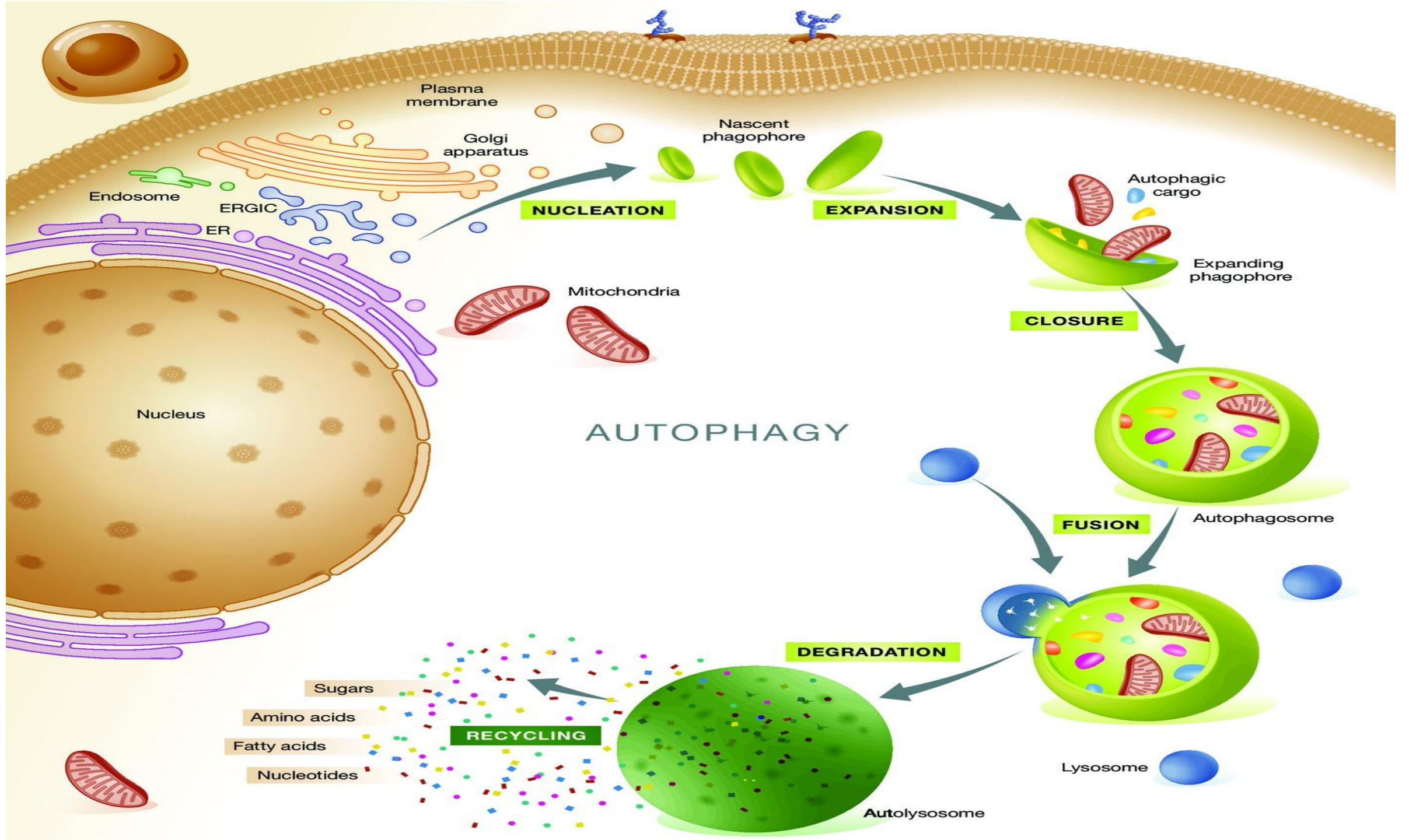


In cancer cells



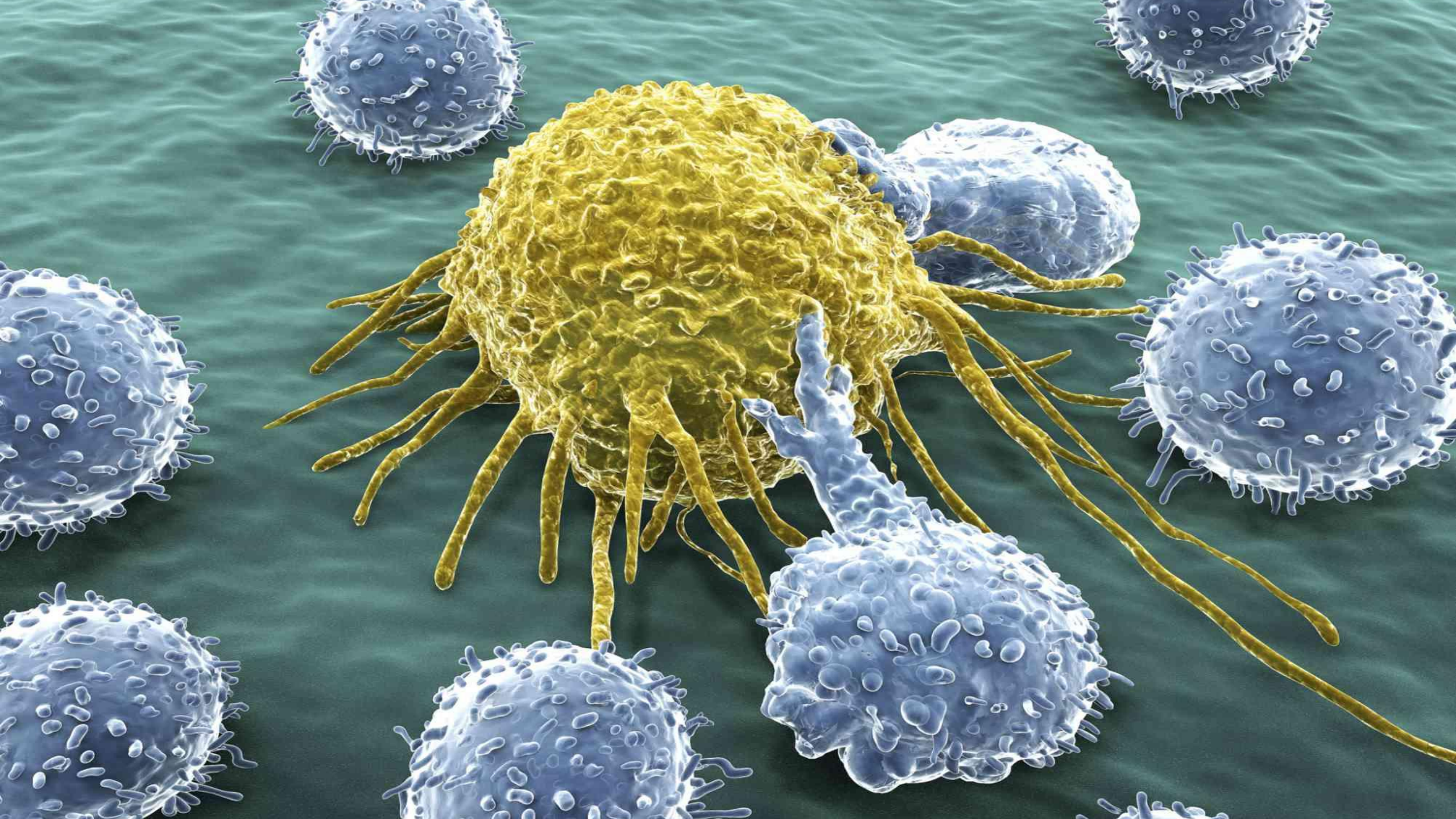
Mechanism 2: Autophagy induction

- Autophagy is a natural cellular mechanism by which cells in our body:
 1. **Degrade** unnecessary components inside the cells (carcinogens, metabolic waste, toxic compounds, etc.)
 2. **Recycle and/or repair** damaged components within the cell (e.g. damaged mitochondria, DNA, plasma membranes, etc).
 3. **Induce programmed cell death (apoptosis)** if the damaged cell can't be repaired.
- Fasting activates autophagy in order to provide an alternate source of energy from the recycled cellular material to help cells survive.
- For autophagy induction, **two to four days of fasting are needed.**
- Once activated via prolonged fasting, autophagy does all the magic – catches carcinogens and all the other bad things, recycle/repairs damaged components of the cells or even kills the precancerous cells via apoptosis induction.



Mechanism 3: Regeneration of the immune system

- Autophagy also activates degradation of too old and exhausted white blood cells, triggering stem cell-based regeneration of new immune system cells in blood marrow.
- Fasting can trigger regeneration of new immune system cells including T-cells that play a large role in fight against cancer.
- T-cells work in both direct and indirect ways to fight cancer:
 1. **Killer T-cells** kill cancer cells directly. These cells first find cancer cells and then produce cytotoxic compounds that kill cancer cells.
 2. **Helper T-cells** fight cancer indirectly. These cells organize and orchestrate the fight against cancer.



Mechanism 4: Positive effects on hormones

- Fasting reduces the levels of a hormone called insulin growth factor-1 (IGF-1) linked to increased risk of cancer, tumor growth and progression.
- Fasting also reduces insulin resistance, allowing insulin to work properly and to increase glucose uptake into healthy muscles and liver cells bypassing cancer cells.

Mechanism 5: Anti-inflammatory and antioxidant actions

- Fasting reduces inflammatory cytokines production and oxidative stress which are also linked to cancer development and progression.

ANTI-CANCER BENEFITS OF MIDDLE EAST SPICES AND FOODS

Spices and herbs with anti-cancer benefits commonly used in Middle East cuisine:

- Turmeric and cumin
- Saffron
- Cardamom
- Nutmeg
- Caraway
- Coriander
- Aleppo pepper
- Cinnamon

1. Turmeric



- After India, Turkey and Iran are one of the largest turmeric producers.
- Turmeric contains **curcumin**, a substance with powerful anti-inflammatory and anti-cancer properties.
- Curcumin may enhance cancer cells apoptosis, reduce inflammation caused by cancer, inhibit cancer cells division, block angiogenesis (production of cancer blood vessels), and reduce metastasis.
- So far, studies found that curcumin has been shown to be effective in the prevention of colon, oral and liver cancer.

2. Saffron



- Iran is the largest producer of saffron in the world and has over 90% saffron production worldwide.
- **Crocins** is considered as the most important anticancer agent of saffron that plays a role in regulating cancer genes expression and apoptosis of cancer cells.

3. Cardamom



- Cardamom is a spice with an intense, slightly sweet flavor that some people compare to mint. Although it originates from India, it is widely produced and used in the Middle East.
- Cardamom is rich in antioxidants that can scavenge free radicals.
- Certain phenolic compounds from cardamom (e.g. luteolin, rutin, catechin, caffeic acid, gallic acid and quercetin) have been shown to fight cancer and potentially stop the growth of tumors.

4. Nutmeg



- Although it originates from Indonesia, it is widely used in Middle East cuisine.
- Nutmeg contains an abundance of antioxidants, including plant pigments like cyanidins, essential oils, such as phenylpropanoids and terpenes, and phenolic compounds, including protocatechuic, ferulic, and caffeic acids.
- Nutmeg has the ability to block cancer metabolism and also has strong antioxidant and anti-inflammatory properties.

5. Caraway



- Also known as “meridian fennel” or “Persian cumin”, caraway has been used in Middle East traditional and folk medicine for centuries.
- It contains a compound called **carvone** which has many health benefits including demonstrated anti-cancer properties on animal models.
- Carvone can promote carcinogens detoxification and thereby lower cancer risk.

6. Coriander



- Coriander is another spice commonly used in Middle East cuisine (predominantly in Egypt) which is full of antioxidants such as **terpinene, quercetin, and tocopherols**.
- It demonstrated immune-boosting, anticancer, anti-inflammatory, and neuroprotective effects.

7. Aleppo pepper



- Aleppo pepper is a widely used in the Middle Eastern and Mediterranean cuisines to give a fresh, fruity and spicy taste to the food with a whisper of salt and vinegar. It is less spicy than jalapeno and standard red chilli pepper, but a bit spicier than a bell pepper.
- It is rich in compounds such as **capsaicin**, **beta-carotene**, **lutein**, **phytofluene**, **capsanthin** and **xanthophyll** which are strong antioxidants, immunity boosters and detoxification agents – all mechanisms involved in cancer prevention.

8. Cinnamon



- As a highly delicious spice, cinnamon is used in many Middle Eastern dishes.
- The distinct smell and flavor of cinnamon are due to the oily part, which is very high in the compound **cinnamaldehyde**. Scientists believe that this compound is responsible for most of cinnamon's powerful effects on health and metabolism as well as cancer prevention.

Other foods with anti-cancer benefits commonly consumed in the Middle East cuisine but not in the rest of the world include:

- Sesame seeds
- Olives and Extra virgin olive oil
- Dates
- Pistachios
- Chickpeas and hummus
- Dill
- Caper
- Colocynth
- Black seeds
- Pomegranate
- Palestinian Arum
- Burghul and freekeh



ANTI-CANCER BENEFITS OF LOW TOBACCO AND ALCOHOL USE



- About 90% of all lung cancers are caused by tobacco smoking. Smokers are up to 22X more likely to develop lung cancer in their lifetime compared to non-smokers.
- Tobacco use accounts for 25% of all cancer deaths (every 4th cancer death).
- There are more than 5000 harmful chemicals in cigarettes, 70 of which are identified to cause cancer.
- Exposure to second-hand smoke is also a cause of lung cancer in non-smokers.
- Other cancers commonly caused by smoking include bowel, mouth, pharynx (upper throat), nose and sinuses, larynx (voice box), esophagus (food pipe), liver and pancreas.
- Drinking alcohol also raises the risk of getting six kinds of cancer— mouth and throat, larynx, esophagus, colorectal, liver and breast cancer.
- All alcoholic drinks, including red and white wine, beer, and liquor, are linked with cancer. The more one drinks, the higher is risk for cancer.
- People who use both alcohol and tobacco have a 5X increased risk of developing cancers of the oral cavity, pharynx, larynx and esophagus compared to people who use either alcohol or tobacco alone. For heavy users, the risk is up to 30X higher.

Source:

<https://www.euro.who.int/>

<https://www.cancerresearchuk.org/>

<https://www.cdc.gov/cancer/alcohol/index.htm>

Tobacco use on Middle East

- About 1 of 5 (20%) adults in the world regularly smoke tobacco.
- On the Middle East smoking is common among males and is comparable or even higher than the average world rates for male smokers. However, female smoking rates on the Middle East are among the lowest in the world (except for Lebanon, Turkey and Israel).
- Top 12 countries by smoking in the world vs. Middle East countries:

Top 12 i the world	Male smokers	Female smokers	Middle East	Male smokers	Female smokers
1. Myanmar	70 %	21 %	1. Lebanon	49 %	36 %
2. Chile	49 %	40 %	2. Turkey	41 %	17 %
3. Lebanon	49 %	36 %	3. Israel	35 %	16 %
4. Serbia	40 %	41 %	4. Iraq	41 %	3 %
5. Bangladesh	61 %	18 %	5. Yemen	32 %	9 %
6. Greece	45 %	33 %	6. Kuwait	41 %	3 %
7. Bulgaria	42 %	35 %	7. Egypt	42 %	0.4 %
8. Bosnia	46 %	30 %	8. Saudi Arabia	31 %	2 %
9. Indonesia	70 %	5 %	9. Iran	25 %	3.5 %
10. Croatia	38 %	35 %	10. UAE	35 %	0.8 %
11. France	36 %	33 %	11. Qatar	27 %	1.3 %
12. Slovakia	39%	26%	12. Oman	18.5 %	0.7 %

Low rates of smoking-caused cancers among women on Middle East

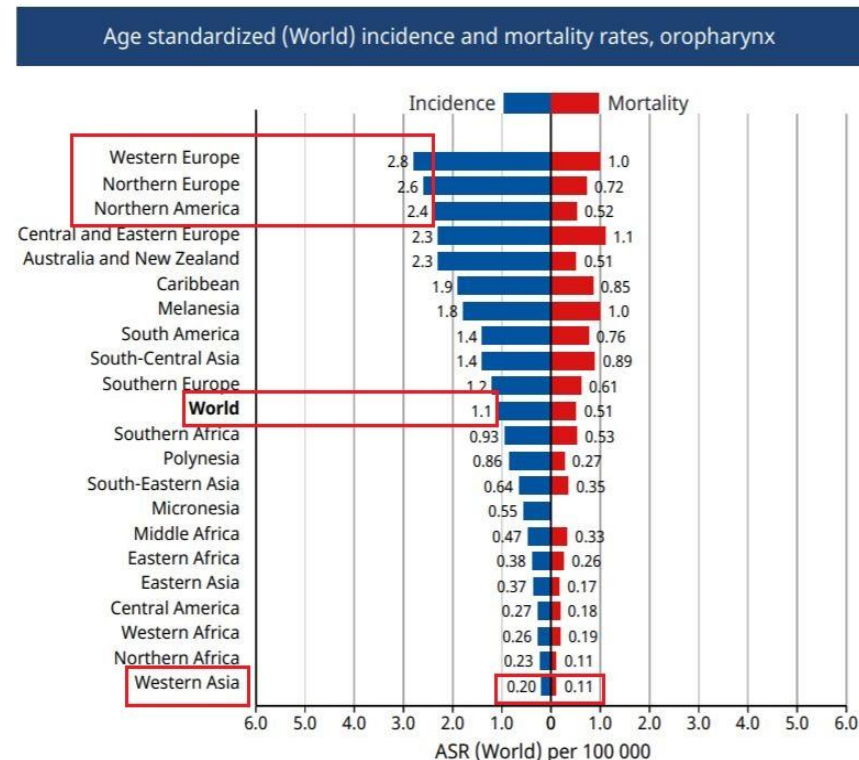
- Low tobacco use among Middle East women is associated with far less cases of lung cancer and other tobacco-associated cancers.
- For instance, women from Saudi Arabia, Qatar and Oman have about 11X less lung cancer cases (about 2 cases per 100,000 people) compared to the average world's lung cancer cases (about 22 per 100,000 people). This is because only about 1 in 50 women from these countries smoke.
- In Egypt, Kuwait and Jordan, women have about 5X less lung cancer cases (about 4 cases per 100,000 people) compared to the average world's lung cancer cases.
- Yemen health officials reported that the majority (83.8%) of lung cancer cases were found in smokers of which 97% males versus 3% females. In Yemen, 1 in 3 males smokes whereas only 1 in 10 females smoke.
- In Lebanon, however, 1 in 3 women smoke, and the female incidence of lung cancer is about 14 per 100,000 people in this country, which is somewhat lower than the average world rates of lung cancer, but 7X higher than in women from Saudi Arabia, Qatar and Oman.

Source:
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6631477/>
<https://pubmed.ncbi.nlm.nih.gov/31668315/>

Alcohol use on Middle East

- Alcohol is completely banned in some parts of the Middle East, such as Saudi Arabia, Iran, Kuwait, Yemen and the Emirate of Sharjah Of the UAE, and consumption remains low even in the rest of the countries (Turkey, Israel, Lebanon, Egypt, etc.) where consumption (and in some cases production) of alcohol is allowed.
- This is one of the reasons why these countries have much lower rates of alcohol-caused cancers including oropharyngeal, esophageal and liver compared to the rest of the world.

Oropharyngeal cancer rates in the Middle East (Western Asia) vs. rest of the world

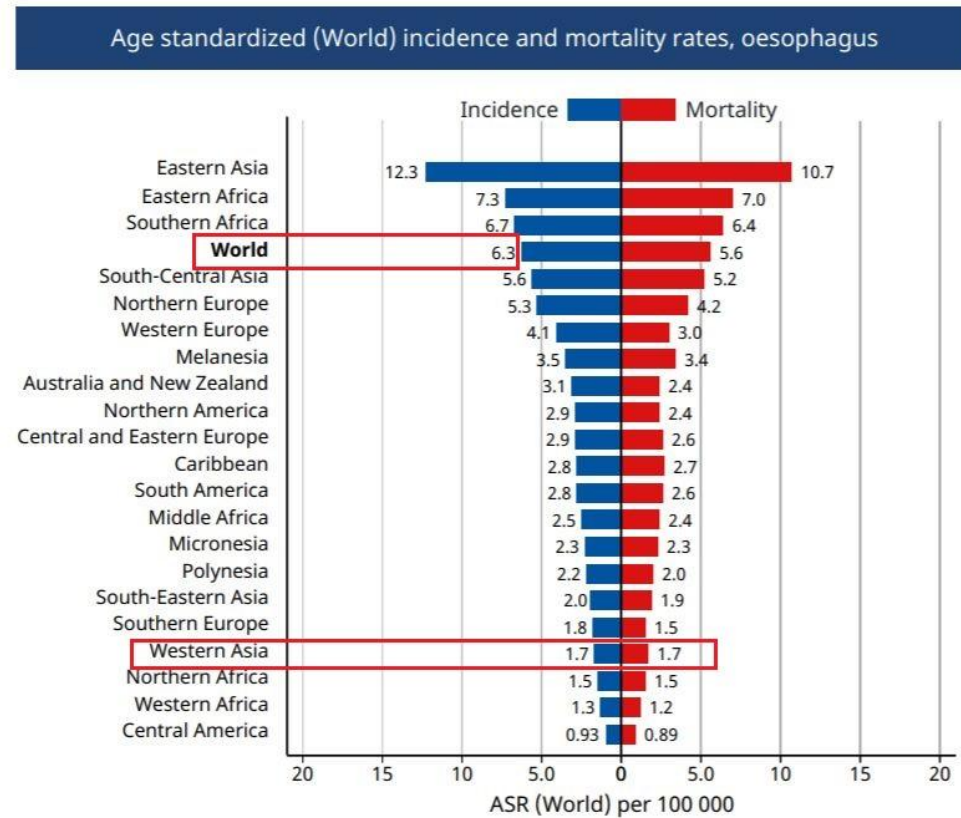


- As shown in the figure, rates of oropharyngeal cancer on Middle East (Western Asia) are **5X lower** than the average rates in the world, and **12-14X lower** than in the Western and Northern Europe (France, UK, Scandinavia, Netherlands, Belgium, Spain, Portugal), USA and Canada where consumption of alcohol is very high.

Source: The Global Cancer Observatory - <https://gco.iarc.fr/>

Alcohol use on Middle East

Esophageal cancer rates on the Middle East (Western Asia) vs. rest of the world

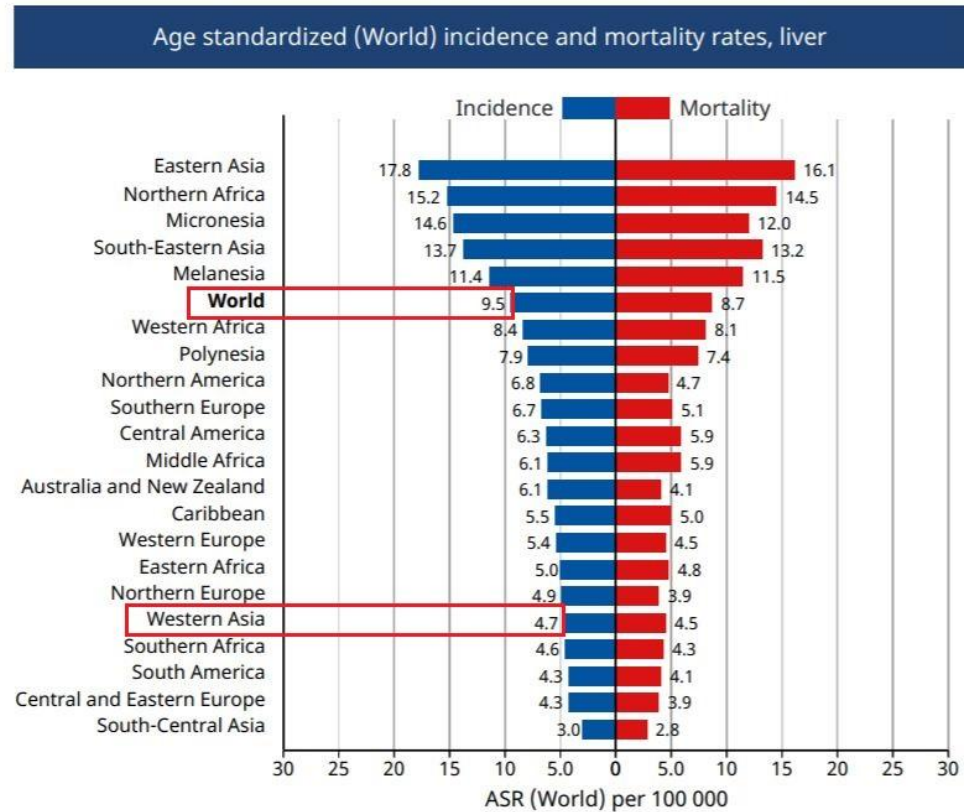


- As shown in the figure, rates of esophageal cancer on Middle East (Western Asia) are about **4X lower** than the average rates of esophageal cancer in the world.

Source: The Global Cancer Observatory - <https://gco.iarc.fr/>

Alcohol use on Middle East

Liver cancer rates on the Middle East (Western Asia) vs. rest of the world



- As shown in the figure, rates of liver cancer on Middle East (Western Asia) are about **2X lower** than the average rates of liver cancer in the world.

Source: The Global Cancer Observatory - <https://gco.iarc.fr/>

WHY IS CANCER STILL PRESENT IN THE MIDDLE EAST?

- Most common causes of cancer in the Middle East:

1. High sugar consumption and diabetes

- People with diabetes are twice as likely to develop liver or pancreatic cancer. They also run a higher-than-normal risk of developing colon, bladder and breast cancer.
- Diabetic women with breast cancer have a higher death rate than women with breast cancer alone.
- Because of high sugar consumption, countries of the Middle East have high rates of diabetes in the world.
- A total of 81 million individuals are now suffering from diabetes in the Middle East.
- Almost every sixth citizen of Egypt, Saudi Arabia, UAE, Bahrein and Syria has diabetes.
- Diabetes rates are somewhat lower in Kuwait, Jordan, Turkey and Lebanon (1 in 9 people has diabetes).

WHY IS CANCER STILL PRESENT IN THE MIDDLE EAST?

2. Obesity

- Obesity is linked with a higher risk of getting colorectal, breast, uterine, esophageal, kidney and pancreatic cancer.
- About 12% of all cancer cases are linked with obesity as a primary cause.
- Obesity is a growing epidemic on Middle East and is predominantly caused by excess calorie intake (mostly through sugars) and sedentary lifestyle.
- About 30% (almost every 3rd) of the population in the Middle East are obese, including adolescents and adults.
- Countries like Saudi Arabia, Kuwait, Qatar, Jordan, UAE, Egypt are among top 20 most obese countries in the world with rates of obesity of about 35%.

WHY IS CANCER STILL PRESENT IN THE MIDDLE EAST?

3. Vitamin D deficiency

- Vitamin D is essential for cancer prevention as it works by supporting immune system and more importantly, it regulates the expression of genes involved in cancer development – hence, low levels of vitamin D can lead to increased expression of genes involved in cancer development and progression.
- Middle East and other Muslim regions (e.g. North Africa) have a very high rate of vitamin D deficiency which reaches up to 80% in certain parts.

Reasons for this include:

- **Cultural practices** – forms of mandatory dressing covering most part of the bodies required for sunlight absorption
- **Climate** - Constantly high temperatures limit daily outdoor exposure to sun.
- **More indoor jobs** - more office workers, fewer farmers
- **Fear of skin cancer**
- **Genetic disposition** – vitamin D receptors polymorphism
- **Skin color** – darker skin needs more sun to produce vitamin D
- **High consumption of sugar and high-fructose corn syrup** – depletes vitamin D production and blocks its activation in the kidneys.

Source: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3772916/>

WHY IS CANCER STILL PRESENT IN THE MIDDLE EAST?

4. Pollution

- Air pollution is estimated to kill about 500,000 people annually in Middle East (1 out of every 10 deaths) which is predominantly associated with non-smoker lung cancer - according to the WHO.
- Most of the air, water and soil pollution in this region occurs from human activities (transport in overcrowded cities, oil industry and other industries).
- Istanbul, Izmir, Riyadh, Dubai, Al-Ahmadi, Doha, Cairo, Jounieh and Baghdad are considered as the most polluted cities in the Middle East.
- However, there are also natural sources of air pollutants in this area coming from dust and sand storms.
- Iraq, Saudi Arabia and Iran are the countries that have reported the highest occurrence of dust storms.
- Particulate matter (PM) reaches more than 60X permissible levels in some cities (eg Zabol, Iran) and can carry carcinogenic elements such as lead, cadmium, nickel, as well as radioactivity.

Source: <https://www.who.int/airpollution/>



Baghdad, Iraq



Dubai, UAE



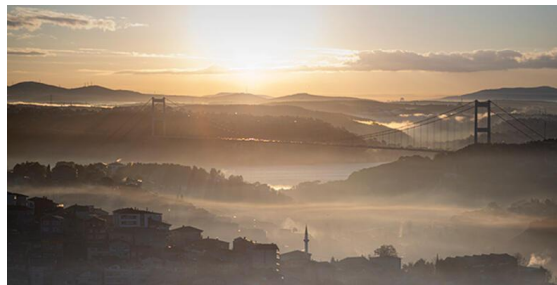
Cairo, Egypt



Doha, Qatar



Riyadh, Saudi Arabia



Istanbul, Turkey