



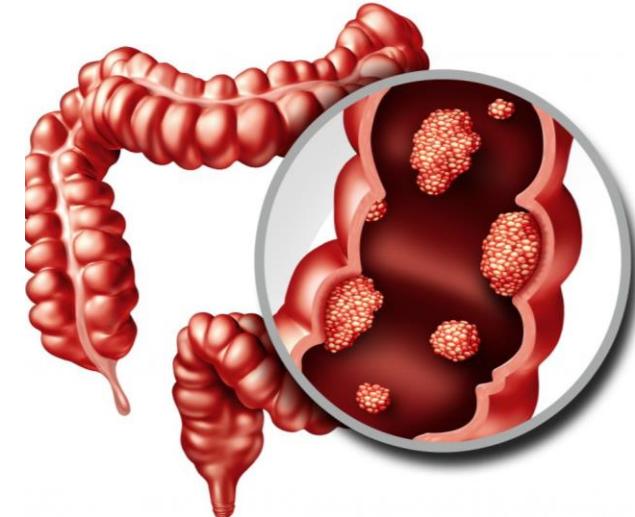
# Effect of Selenium on gut microbiota in Colorectal Cancer

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# Introduction

- Selenium (Se) is an essential micronutrient for humans and other mammalian species
- Se deficiency is a risk factor for a range of chronic diseases i.e. colorectal cancer (CRC)
- Adequate supplementation of Se can provide **anti-oxidant** benefits against: oxidative stress, inflammation, and carcinogenesis.



**anti-oxidant      anti-cancer**

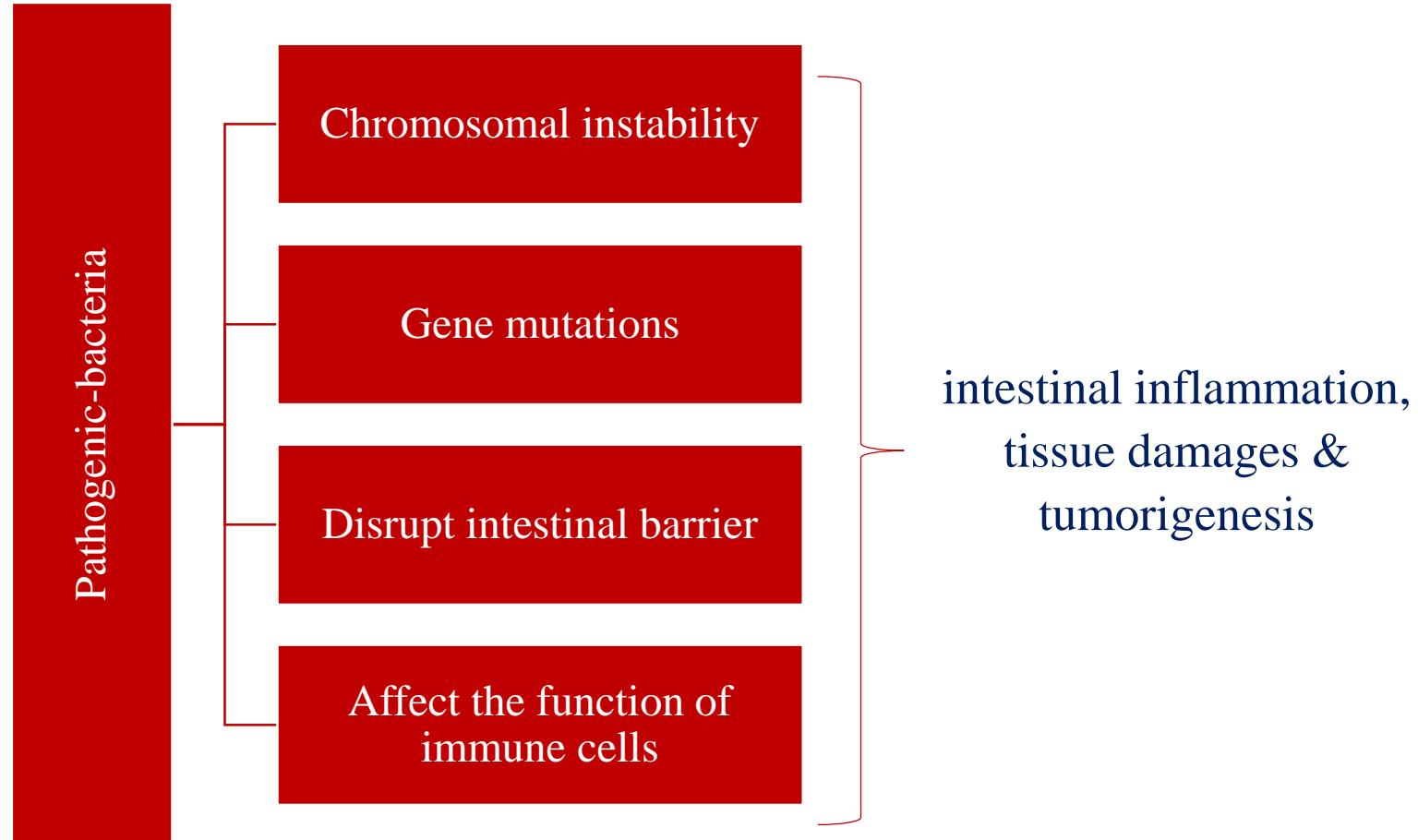
**Selenium**



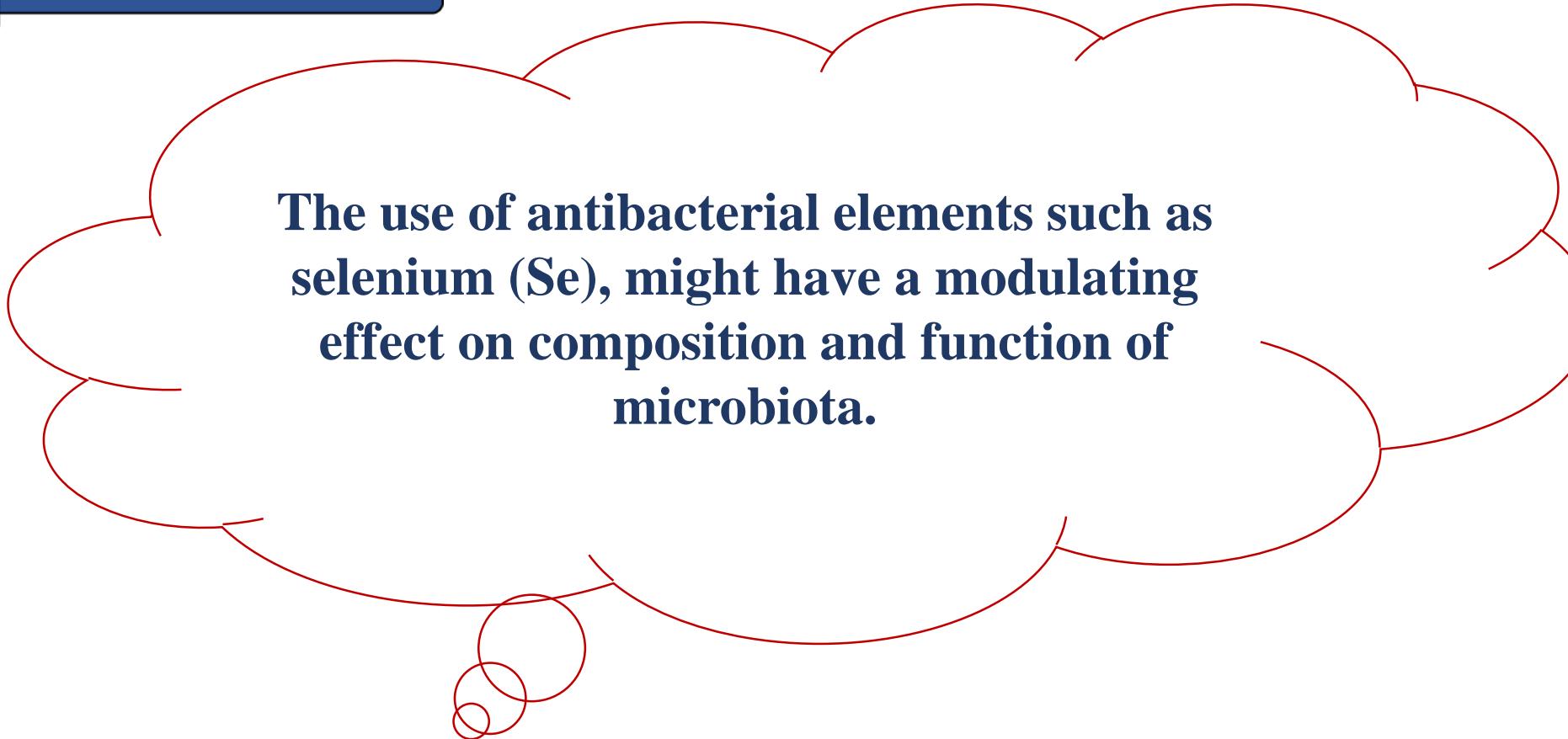
# Introduction

- Microbiota as an effective part of gut mucus plays an important role in the maintenance of gut integrity and homeostasis.
- Alterations of gut-microbiota profile by increasing the abundance of pathogenic-bacteria and reducing the beneficial-bacteria, are associated to colorectal adenomas (CRA) and cancer (CRC).

# Introduction



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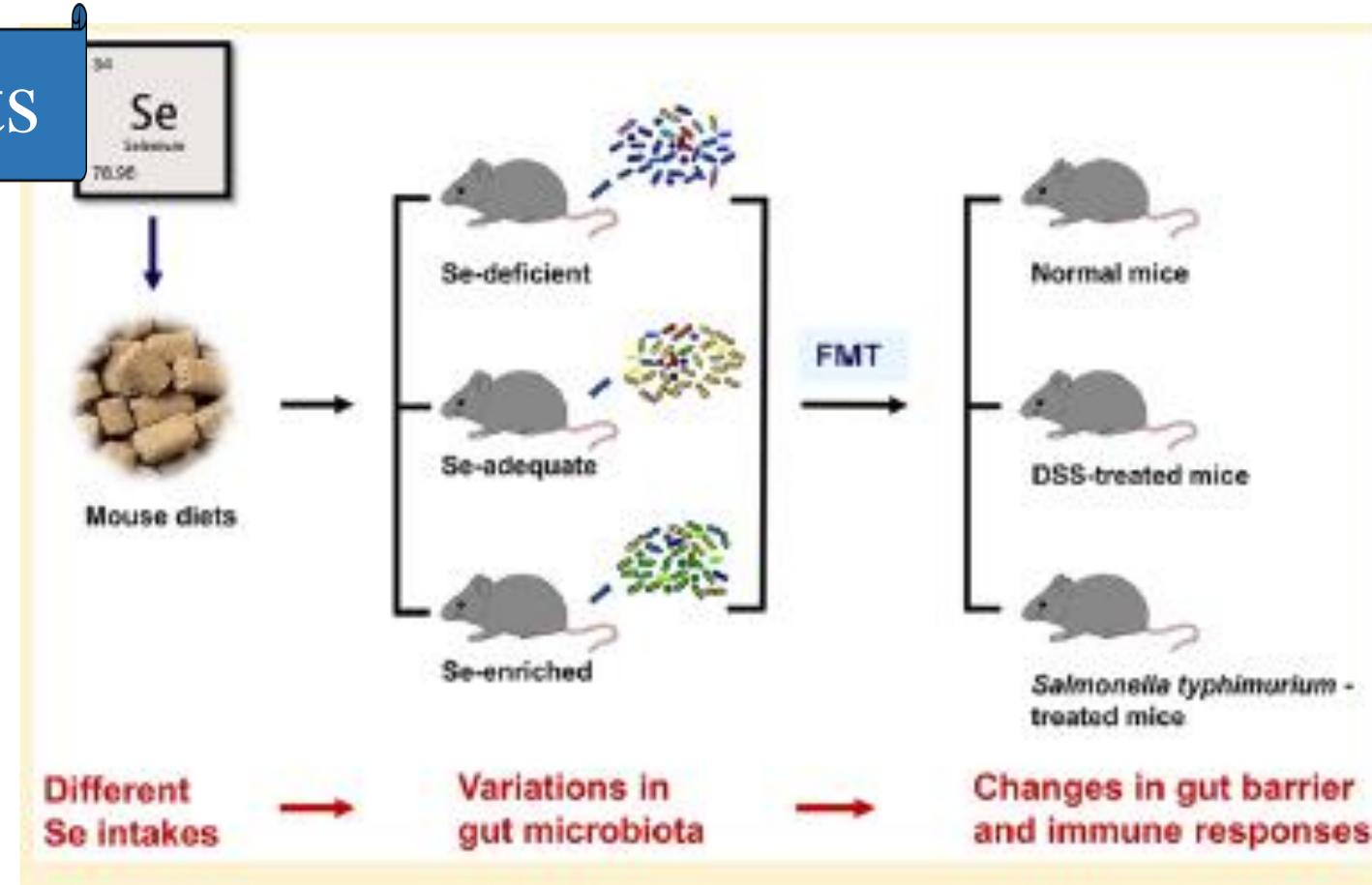


The use of antibacterial elements such as selenium (Se), might have a modulating effect on composition and function of microbiota.

# Methods

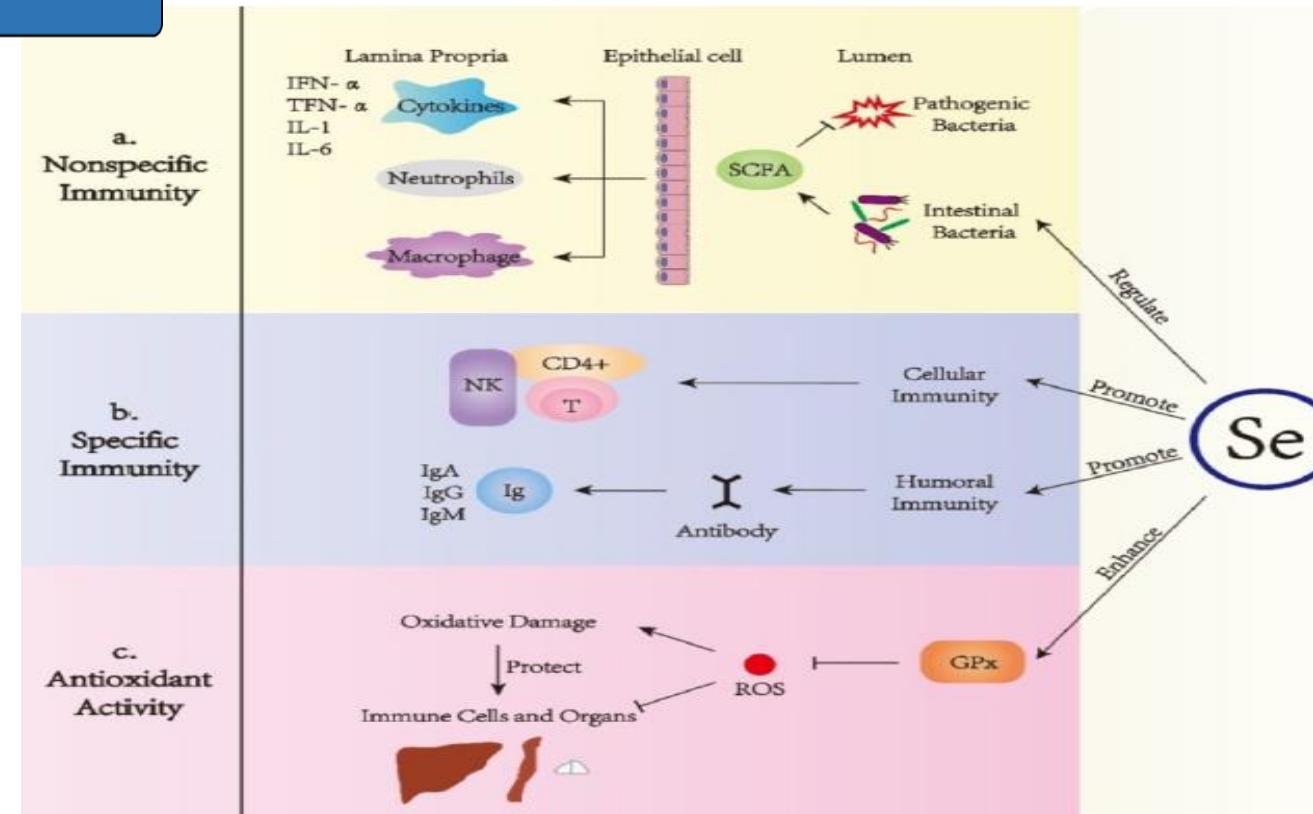


# Results



- Alterations to the gut microbiota induced by dietary Se supplementation could affect the gut barrier and immune responses of the host.
- The mechanism is at least partly due to the effects of the altered gut microbiota, independent of the direct effects of Se on the gut, as evidenced by Fecal microbiota transplantation (FMT).
- Deficient Se supplementation may result in a phenotype of gut microbiota that is more susceptible to DSS induced colitis and ST-infection. Sufficient or supranutritional Se intake can optimize the gut microbiota for protection against intestinal dysfunctions.

# Results

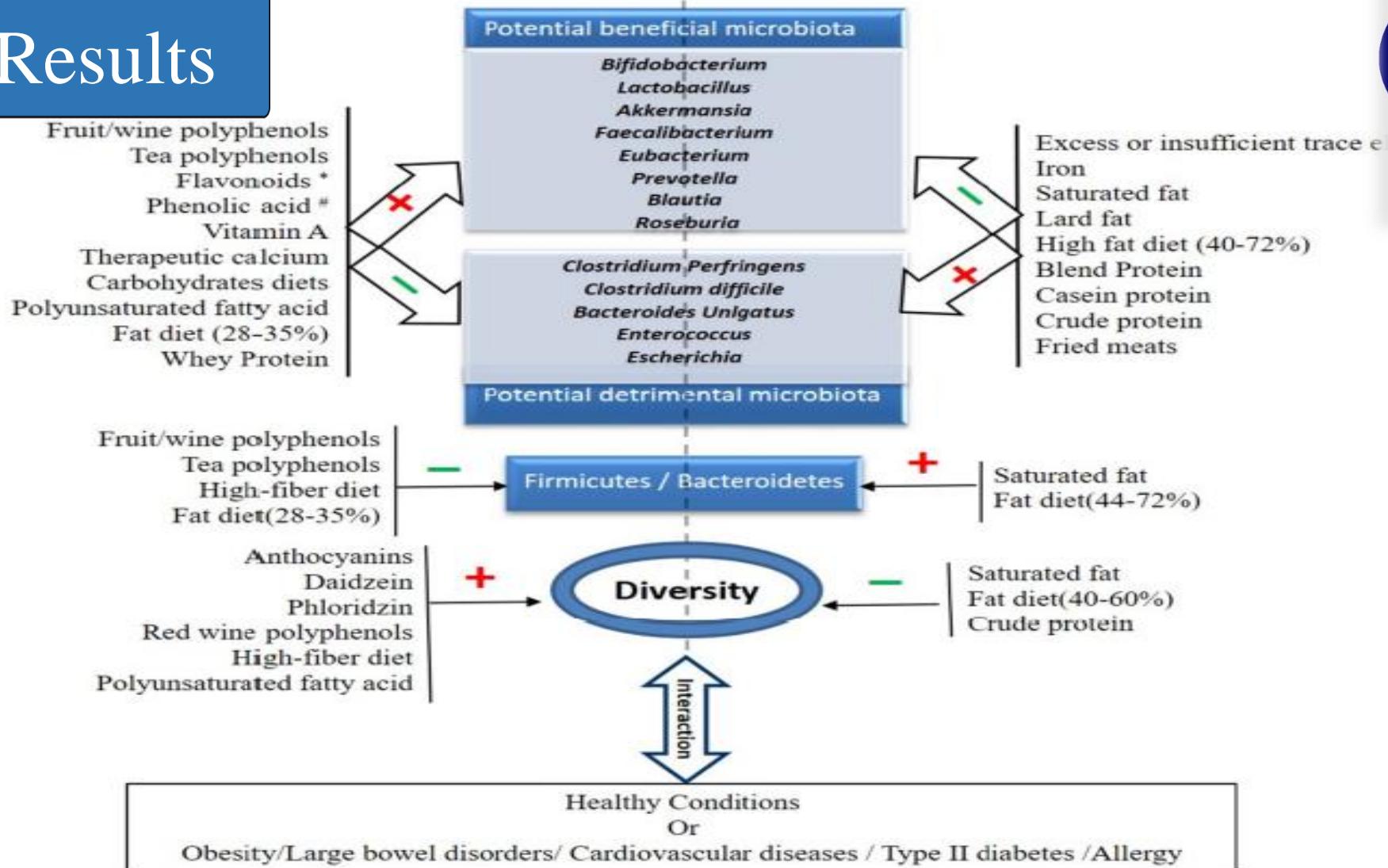


**Immune regulation mechanism of selenium:** In nonspecific immunity (a), selenium mainly protects against foreign pathogenic bacteria through intestinal mucosal barrier, intestinal mucosal epithelial cells and metabolites secreted by intestinal flora (such as SCFA) maintain intestinal immunity.

In specific immunity (b), selenium regulates the cellular immune function by promoting the proliferation and differentiation of CD4+ helper T cells, and reducing the killing activity of NK cells.

In antioxidant activity (c), selenium, as the main component of selenium-containing enzyme GPx active center, can increase GPx activity, enhance antioxidant and reduce ROS content through selenium supplementation, so as to protect immune cells and organs from oxidative damage.

# Results



**Figure 2.** Effect of micro-and macro-nutrients on potential beneficial or detrimental gut microbiota:  
Se supplementation could increase probiotic-microbiota, ratio of beneficial to pathogenic-bacteria and quantity of butyric acid as an energy source of colonocytes where develop intestinal morphology and villus height for improvement of capacity of nutrients absorption.



## Discussion

- Se increases bacterial fermentation products such as short chain fatty acids, which improve the immune responses, epithelial tight junctions, gut integrity, mucosal functions, control bacterial pathogenesis, inhibit inflammation and carcinogenesis and decrease oxidative stress.
- So:

Se may protect against colorectal cancer by modulation of probiotic bacteria, improvement of intestinal morphology and increase in bacterial fermentation.

## References

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