

Crosstalk between gut, brain and metabolism in polycystic ovary syndrome

Polycystic ovary syndrome (PCOS), the most common endocrine disorder of women in childbearing age, is characterized by hyperandrogenism, oligo-anovulation and polycystic ovaries in ultrasound. Obesity, a global epidemic, generally accompanies PCOS; but the link between these two common disorders could not be fully established. Food intake is a complex action, which is regulated by brain and also by properties of food, gastrointestinal hormones and other complex interactions. Gut, brain and metabolism are closely related with each other in obesity and diabetes as well as PCOS. Brain regulates food intake according to energy demands of the body through homeostatic system as well as rewarding values of food through hedonic system.

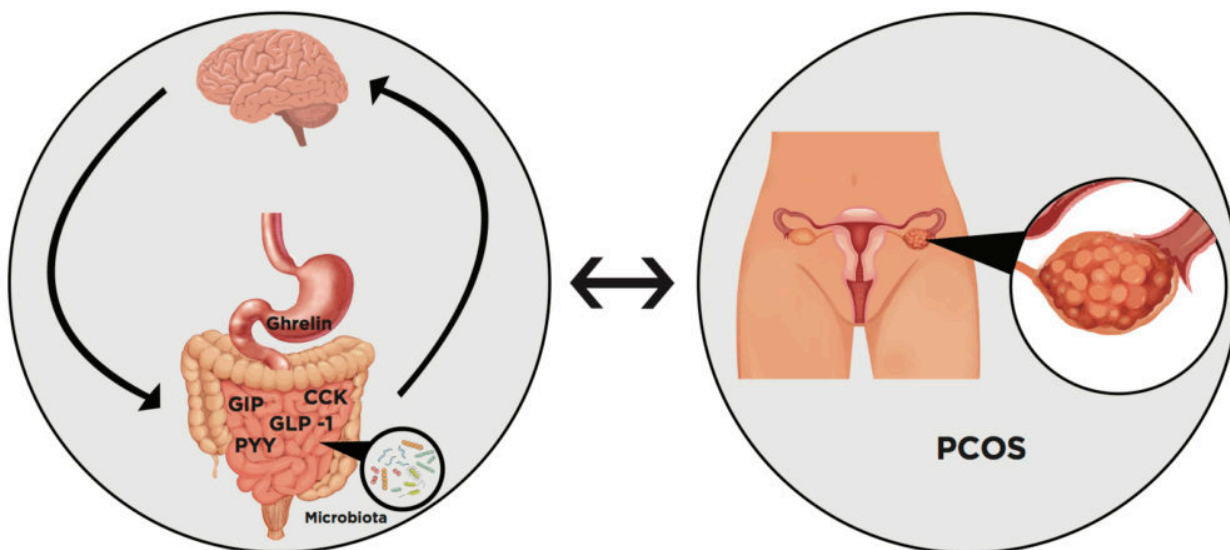


Fig. 1.

Meanwhile, gut synthesizes orexigenic and anorexigenic hormones informing the brain about short-term energy stores and adipocytes produce leptin, informing the brain about long-term energy stores. Ghrelin is the only peripheral orexigenic hormone which increases appetite while other gastrointestinal hormones such as glucagon like peptide (GLP-1), gastric inhibitory peptide (GIP), peptide YY (PYY) and cholecystokinin (CCK) are anorexigenic with appetite decreasing effects. The crosstalk between central nervous system and gastrointestinal system is thought to be altered in PCOS. Patients with PCOS has decreased or unaltered basal ghrelin levels and postprandial ghrelin suppression when compared to healthy women. The levels of anorexigenic hormones are either unaltered or decreased in women with PCOS except for GIP whose levels are either increased or unaltered. Gut-brain interactions are also influenced by dietary, medical and surgical

approaches as well as gut microbiota. However implications of these interactions on PCOS is still to be investigated. Dietary interventions are the mainstay of treatment of women with PCOS, however studies did not show significant relations with dietary interventions and levels of these gastrointestinal hormones. Medical therapy of PCOS is mainly composed of oral contraceptives and insulin sensitizers. Short-term oral contraceptive use was not associated with alterations in gut peptides, however use of metformin was associated with increased levels of ghrelin, PYY, GLP-1 and GIP in women with PCOS. GLP-1 agonists and bariatric surgery both have significant impacts on gut-brain axis and they appear to be beneficial options for obese women with PCOS. Also alterations in gut microbiota and possible interactions with gut-brain axis is a newly emerging research topic. Overall, investigating the crosstalk between brain, gastrointestinal hormones and gut microbiota as well as possible effects of dietary, medical and surgical interventions on these systems will provide valuable understanding and novel therapeutic options for PCOS.

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