Physiology

Decellularization and hope for whole organ bioengineering
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End-stage renal disease (ESRD) is a leading cause of morbidity and mortality, affecting an estimated 13% of the population worldwide. Currently there is no complete cure for ESRD, and, although the condition can be managed with hemodialysis, it does not restore the homeostatic and endocrine functions of the kidney. Therefore, the only functional restorative treatment for these patients is kidney transplantation. However, the shortage of available donor organs, morbidity associated with immunosuppression, as well as the high rate of organ rejection, supports the need for new therapies. During the recent few years, researchers have innovated the idea of decellularization. This resulted in a breakthrough in the whole organ bioengineering. The goal of decellularization is to remove all the cellular components from the tissue derived even from animals, such as pigs, while maintaining native extracellular matrices (ECM) and the inherent vasculature. This type of naturally occurring scaffold is prepared by using detergents perfusion, physical or enzyme-based processes. The recellularization of these scaffolds can be achieved with different cell sources, such as stem cells or adult differentiated renal cells. Such a bioengineered graft can provide the kidney’s architecture and function, permit perfusion, filtration, secretion, absorption, and drainage of urine with no immune response after in vivo transplantation on the host.

A cross talk between ursolic acid and possible fertility disorders induced by metabolic syndrome in experimental male rats
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Metabolic syndrome is a complex pathophysiological entity and increased saturated fats and refined carbohydrates in diet were proved to pave the way for different metabolic syndrome parameters as well as high tendency for infertility. Ursolic acid is a promising natural herbal drug that possesses anti-oxidant, anti-inflammatory and more recently antidiabetic actions. The Aim of the study is to explore the possible ability of ursolic acid in either high or low dose to protect against possible fertility disorders induced by metabolic syndrome.

Methodology: Eighty four adult male Wistar rats were equally allocated into six groups for eight weeks duration: Group I: control rats that were fed regular diet (C), Group II (CH) and Group III (CH): control rats that were fed regular diet and received 5 mg/kg ursolic acid and 16 mg/kg ursolic acid respectively, Group IV: metabolic syndrome induced rats that received high fat high fructose enriched diet (Met.S), Group V: metabolic syndrome induced rats that received 5 mg/kg ursolic acid (Met.S.H) and Group VI: metabolic syndrome induced rats that received 16 mg/kg ursolic (Met.S.H) ursolic acid was given by daily oral gavage. Body weight, naso-anal length, body mass index (BMI), waist circumference, arterial blood pressure, heart rate were assessed. Fasting blood glucose, serum insulin, lipid profile, free testosterone, prolactin and FSH, all were measured and HOMA-IR score was calculated. Epididymal sperm count, retroperitoneal fat weight, epididymal weight, testicular tissue malondialdehyde (MDA) and glutathione peroxidase (G-PX) activity were assessed, in addition to histological examination of the testicular tissue.

Results: High fat high fructose – enriched diet in this study resulted in dyslipidemia, hypertension, insulin resistance, increased waist circumference and retroperitoneal fat. In addition, higher serum prolactin level, testicular tissue MDA levels were observed together with significantly decreased serum testosterone and epididymal sperm count compared to normal control. Moreover, testicular tissue on histological examination showed a decrease in number of primary spermatocytes. On the other hand, in comparison to normal control group I, both low and high dose ursolic acid supplementation in concomitant with the regular diet in group II and group III respectively caused a significant decrease in final body weight, %change of body weight, retroperitoneal fat weight and better lipid profile which was marked with high dose. In contrast, when ursolic acid was given in concomitant with induction of metabolic syndrome (group V &VI), it improved insulin resistance, blood pressure, distribution of fat specially with high dose yet it caused higher serum prolactin in comparison to the metabolic syndrome induced group (group IV). Ursolic acid use in the four tested groups showed a decrease in number of primary spermatocytes in examined testicular tissues.

Conclusion: Metabolic syndrome has a negative impact on male fertility, which could not be improved by ursolic acid supplementation that aggravated these fertility changes.

Effect of probiotics on serum indoxyl sulphate in haemodialysis patients
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Chronic kidney disease (CKD) is a worldwide health problem that has many clinical outcomes and affecting the patients due to accumulation of uremic toxins. Many classifications for uremic toxins based on different aspects specially bounding to plasma proteins and molecular size are well known now and affect the mechanism and module of replacement therapy that fit End stage renal disease( ESRD) patients.Indoxyl sulphate(IS) is a protein bound uremic toxin that has many deleterious effects on cardiovascular system with deterioration of kidney functions, It is believed that gut kidney axis with dysbiosis and leaky gut in CKD patients have main roles for production of IS and so targeting gut microbiota and modifying the dysbiotic content in CKD patients can help in decreasing IS. Probiotics are
Chronic kidney disease (CKD) impairs the intestinal barrier function which is mediated by influx of urea and its conversion to ammonia by microbial urease. The degradation of epithelial tight junction (TJ) allows influx of noxious products such as indoxyl sulfate causing systemic inflammation.

**Aim:** to explore the ability of oral activated charcoal to adsorb urea, urea-derived ammonia and indoxyl sulfate and its ability to ameliorate CKD-induced intestinal epithelial barrier disruption, systemic inflammation and progression of Chronic kidney disease.

**Methods:** Rats were randomized into four groups with regular chow diet. Group I: Sham control, Group II 5/6th nephrectomized rats for 6 weeks. Group III 5/6th nephrectomed rats for 6 weeks supplemented orally by activated charcoal immediately after surgery (4 g/kg/day), group IV 5/6th nephrectomized rats for 6 weeks supplemented by activated charcoal 2 weeks after surgery (4 g/kg/day). Animals were scarified and the brain tissues were processed for histopathological examination.

**Results:** Compared with the sham controls, the untreated CKD rats showed significantly elevated serum urea, creatinine, indoxyl sulfate, C Reactive Protein as well as increased diastolic blood pressure, reduced body weight gain and histological manifestation of colonic erosions and renal fibrosis. Both early and late administration of activated charcoal resulted in significant reduction in serum urea, creatinine and C Reactive protein. Also relative improvement in body weight gain with partial restoration of the colonic mucosal integrity and reduction in renal fibrosis index were observed with charcoal treatment. Indoxyl sulfate was only significantly reduced with early treatment. Activated charcoal was unable to combat the change in diastolic blood pressure with CKD.

**Conclusion:** Administration of activated charcoal attenuated uremia-induced disruption of colonic mucosa and the associated endotoxemia, inflammation and progression of CKD specially with early supplementation.