Balneotherapy for humans has a long tradition in Germany. Carbonated water or CO₂ containing spring water has been known for ancient times, not only in spas for bathing but also for drinking. In 1845 the German spa physician Dr. F. Bodo from Bad Nauheim noted a “congested, velvety reddened skin” after taking a bath in warm CO₂ enriched water. Conducting absorption experiments Hediger in 1928 demonstrated for the first time that CO₂ is absorbed into the body by passing through the intact skin. In Germany 80% of the natural mineral spas contain the minimum concentration of 400 mg/kg CO₂ required for treatment and 50% of all spas have a CO₂ content higher than 1000 mg/kg which is required for the designation as carbon dioxide enriched water. The spa resorts Bad Nauheim and Bad Krozingen harbor natural mineral springs with the world wide highest CO₂ concentrations containing 2600 mg/kg and 2200 mg/kg, respectively. These springs belong to artesian wells which means the spring water is under a hydrostatic pressure that is high enough to well up to the surface without any pumps.

The beneficial effects of CO₂ balneotherapy are not known in detail yet. However, animal studies have shown that bathing in carbon dioxide rich water enhances collateral blood flow in ischemic hindlimb through mobilization of endothelial progenitor cells and activation of NO system. Daily CO₂ bathing for 28 days induced a 4 fold increase in collateral vessel density which was prevented by the administration of L-NAME a NO inhibitor. In humans CO₂ bathing improves arteriolar blood flow in patients with arterial occlusive diseases. Patients with necrosis of skin and soft tissue due to disturbed blood flow showed profound improvement of the skin defects with decrease of the necrosis area. To the skin CO₂ enriched water has topical effects. Ten days of rinsing detergent-damaged skin with CO₂ enriched water enhanced clinical skin regeneration, enhanced epidermal lipid synthesis and enhanced barrier repair. Taking together CO₂ balneotherapy has different beneficial effects on human diseases. This review presents the effects of CO₂ enriched water on humans diseases and discusses its clinical indications.

Keywords: CO₂, Balneotherapy