

# Taste dysfunction related to chemotherapy treatments

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Cancer can be defined as a massive group of malignant conditions with specific aspects as unusual cell proliferation, poverty of controlled growth, a capacity to spread, capacity to affect any tissue in the body, and evasion of normal cell death (Polovich et al., 2016). Annually, just in the United Kingdom, 285, 000 persons are recognized with most cancers (Airley, 2009). Chemotherapy is used to kill neoplastic cells but, there are commonly some healthy cells which can be also killed and this can cause to the patients a variety of side effects (Govinder, 2014). The ordinary malignant cells take longer than the regular cells to develop. Consequently, chemotherapy is given in cycles to permit the ' regular' cells to get better. Chemotherapy may be used for healing purpose or palliation. It may be used alone or as an adjunct to different remedies (surgical operation, hormonal therapy or radiotherapy) (Govinder, 2014).

Cytotoxic drugs had been related to chemosensory problems and are recognized to harm chemosensory systems and disrupt saliva and mucus production. Studies into the adverse effects of cytotoxic chemotherapies show that forty-six to seventy-seven percent of people receiving chemotherapy mentioned modifications in taste (Bernhardson et al., 2007). Changing in taste can be difficult to treated, the literature reports that it is one of the most underrated phenomena since it does not represent an imminent danger for the patient's life (Murtaza et al., 2017) and just the 17% of the people that are going to start chemotherapy treatment obtain information on how to deal with taste problems (Rehwaldt et al., 2009) It is important to recognize when the patients are experiencing changing taste as this can be really frustrating and may cause serious life threatening

problems as anorexia and cachexia which can develop due to depression and malnutrition (Polovich et al., 2016). Taste is a crucial sensation that serves to judge the nutrient content of food, stop intake of probably harmful substances and a fundamental element for maintaining a correct nutritional intake (EpsteinBarasch, 2010). The function of taste is described as the sensation that is emanated when taste receptors on the tongue are stimulated by chemical molecules (Boltong et al., 2014). Five taste qualities have been classified: sweet, sour, salty, umami and bitter (Boltong et al., 2014). Normally, smells disorders can be found together with taste disorders (KerashawMattes, 2018). It is possible to have a complete loss of taste and smell ( ageusia and anosmia) or a decrease of function ( hypogeusia for the taste and hyponosmia for the smell). Many people can also report an altered sensation of taste ( like the metallic taste), called dysgeusia, or a distorted sense of smell (a particular smell can be stronger than normal) known as dysosmia (KerashawMattes, 2018).

Changing taste is a common side effect of radiotherapy and chemotherapy, however, sometimes can be a tumour the one who is causing the taste alterations and can be also related to other causes as bad hygiene of the oral cavity, stomach problems, some types of antibiotics or some bacteria (Gamper et al., 2012) When the radiotherapy treatment is finished, the taste sensation can go back to normal as the mucosa, which was previously damaged by the radiations, will recover (EpsteinBarasch, 2010). As well, most commonly utilized cytotoxic specialists have been connected to chemosensory clutters, and are known to harm chemosensory structures and

disturb split and body fluid generation (Bernhardson et al., 2007). When the change in taste is coming as a consequence of a chemotherapy drug, can last even 6 months after the end of the treatment (KerashawMattes, 2018). Patients might experience a metallic or chemical taste once therapy is delivered, and this is according to drug secretion in spit. It is instructed that cell injury happens in 3 ways: a decrease in the variety of traditional cell receptors, alteration of cell structure or receptor surface changes and interruption of neural wiring (Kalaskar, 2014). The prevalence of metallic taste ranging from 10% to 78% in people with cancer treated with chemotherapy. Despite the excessive incidence of metal taste, this alteration has obtained restricted attention (Ijpma et al., 2016).

Furthermore, people who mentioned a weight loss after the start of the treatment, have been more likely to experience the sensation of metal taste compared with the one who reported an increase in the weight. The reason why there is a relation between food intake and metallic taste is presently not clear as there are no studies focused on this particular problem (Ijpma et al., 2016). Rehwaldt et al., 2009 on her study reported how people experiencing metallic disorder can find helpful eating colder food and Ijpma et al., 2016 describe some methods that can help to lower this sensation such as avoiding metallic tableware, add seasoning herbs, and spices. Five chemotherapy drugs have been related with dysgeusia like folinic acid antagonists, cyclophosphamide, platinum agents, taxanes and methotrexate (Zabernigg et al., 2010). Besides, aged and smoker people have higher possibility to develop changing in taste (Zabernigg et al., 2010).

In the treatment of dysgeusia, the use of zinc supplement has been often tried, with an equivocal end result (Heckmann et al., 2005). Zinc is an omnipresent element that is indispensable to the expansion and development of microorganism likewise as plant and animals. The problems related to the decrease in the level of this chemical element were at first recognized in 1961 (Yagi et al., 2013)

The body of a grown-up person should have between two to three grams of zinc, this element is absorbed from the dietary intake in the intestine and from there will be liberated into the bloodstream (Sauer et al., 2016). At present no definitive treatment has been found helpful to mitigate taste disorder related to chemotherapy agents (Strasser et al., 2008). Zinc is a relevant element on either the preservation and reconstruction of taste buds. Zinc controls the synthesis of the protein gustin that is related to the creation of taste buds (Kumbargere Nagraj et al., 2017) but its use during the chemotherapy treatment as a protection against taste disorders had narrow effectiveness (KerashawMattes, 2018). Clinical use of Glutamine (an essential amino acid) in people with cancer has been reported and its use was described convenient in people who experienced peripheral neuropathy but not in the ones who complained to have taste alterations (Strasser et al., 2008). Acupuncture was also used but there are not evidences of its effectiveness (Kumbargere Nagraj et al., 2017) Session of education before the start of the chemotherapy treatment of how to cope with taste disorder can be a benefit for the patients. There are, indeed, evidence that shows that people are more likely to improve their own self-care if informed

correctly in advance about the possible side effects of a treatment (Rehwaldt et al., 2009). A development of assessment tools for taste disorders is still needed (Cowart, 2010). A decreased of taste may be measured with chemical or electrogustometric device but does not measure a change in taste.

Nevertheless, the use of taste strips on the tongue was recommended to measure the taste disorders but this practice is not able to recognize both quality specific losses or spatial losses and it is not clear if this method can diagnosed other complications that are not ageusia (Cowart, 2010).

Zabernigg et al., (2010) used the EORTC which is a validate questionnaire to assess the quality of life of patients with cancer, and he created and added to it some questions related to taste disorders as “ Have you had problems with your sense of taste?” and “ did your food or drink taste different from normal?” and trough this short screening they were able to identify that there is an important decrease of the quality of life in the patients that are experiencing modification in taste as this has a bad impact of the social life of the people that may start to avoid eating in company and this can decrease their social life, also the patients may change the eating habits and this can have an impact on their family too (Zabernigg et al., 2010) Taste dysfunction can be relate to a state of malnutrition (Kalaskar, 2014).

Malnutrition is a medical situation where there is a disproportion of protein, energy, and other micronutrients and this can affect the body and the tissue function and balance (Santarpia et al., 2011).

Patients who are experiencing this problem are more likely to avoid foods and decrease their oral intake with great possibility to develop anorexia (Sánchez-Lara et al., 2010), the reasons why they can escape the food intake consist of: poor cravings because the altered taste, and poor appetite due to the depression that may develop (Epstein et al., 2002). Malnutrition can become cachexia if not managed as early as possible. Cachexia is a situation that include different aspects and is define by: loss of muscle, fat and severe weight loss with a decrease of the nutrients available for the body. If the cachexia develops there is no treatment and this can increment the mortality of the patients (Santarpia et al., 2011), yet malnutrition has been related with a modification of how the cancer treatment is working in the body and how the drug is absorbed (VandebroekSchrijvers, 2008). It is important evaluate the patients every day and work together with others professional figures (dieticians, physiotherapist) in order to prevent the development of the malnutrition (Santarpia et al., 2011; VandebroekSchrijvers, 2008).

Patients are normally starting the management of their symptoms by themselves using their own methods (Belqaid et al., 2018). The strategies that seem to work most are: eat less but more often, using candies, add more condiments, escape food with heavy smell and meat, use spices and cold food (Cewart, 2010). However, its important advise people to do not add to much salt or sugar to the dishes as they may develop high blood pressure or an increase of the blood sugar level (Steinbach et al., 2009; Su et al., 2015). The use of ice cubes has been reported helpful to treat taste disorder

as the taste buds are responsive to temperature. However, more studies about how to treat taste disorders are needed (Su et al., 2015; KerashawMattes, 2018)

Some psychological approaches has also been tried with good effect as make the patients aware that the modification of the taste is just caused by the cancer and will go away and to remain them how the food tasted like before their taste changed (Kalaskar, 2014) . In conclusion, taste is an important sensation of the human and some of the chemotherapy used to treat cancer can change this function with a considerable impact on the quality of life of the patients that will found themselves to deal with a possible decrease of oral intake and social event related to food. The use of the Zinc supplement has been tried but needs more research as at the moment was found to have narrow effectiveness. Glutamine has been reported to be not effective in this type of disorders and there are no evidence about the effectiveness of the acupuncture. It is important assess the patients for malnutrition every day with the help of others professional figure in order to avoid the development of cachexia that may increase their mortality. Yet, the patients can start to use their own strategy to cope with the taste disfunction but is still important remind them how to manage this symptoms in order to avoid secondary side effects (hypertension, hyperglycaemia), the use of psychological techniques can be also effective.

Assessment tool for taste disorders are needed as at the moment there is not a valid tool to measure the change of the taste. Questionnaire and use of QOL tools has been reported have more effect as trough them is possible



assess the impact that taste disorder have on the quality of life. It is crucial give a good pre-treatment educations about how to manage this side effect because this strategy was reported to be the best way to improve the self-care of the patients as they felt more prepared to deal with the disorder.