

## Editorial

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# Hair Loss and Chemotherapy: An Overview about What You Need To Know

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Although, hair does not have a vital function in human beings, its loss could possibly be associated with the complications of psychological functions. Hair loss, is often distressing and can have major effects on the quality of life (QoL) and self-esteem of the individual. Hair loss may be (i) idiopathic, (ii) associated with aging, (iii) related to a genetic predisposition, (iv) due to some diseases and infections or (v) in consequence of metabolic and hormonal abnormalities. In such cases, the individuals must be subjected to a criterious clinical examination and the personal and family histories, diet, medication, and hair care habits must be considered.<sup>1-3</sup>

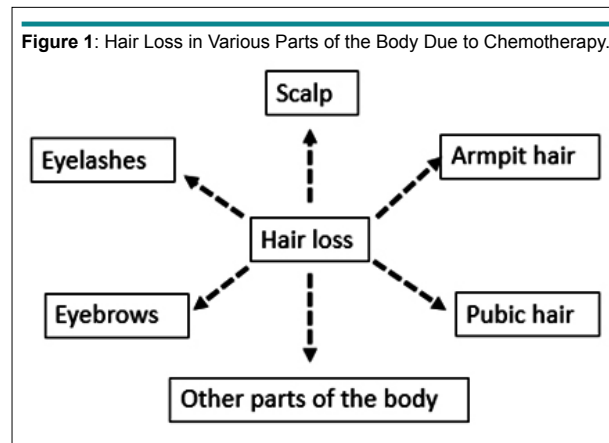
In general, hair loss is the impairment of the hair follicles with the obliteration of follicular orifices and its replacement by fibrous tissue are verified.<sup>4</sup> Alopecia, an autoimmune disorder in which the immune system attacks hair follicles, is believed to cause alopecia areata. Alopecia areata is a condition which usually affects the scalp. It causes one or more patches of hair loss. Among the other various factors that can commonly promote hair loss, drugs used for chemotherapy used in the management of the cancer are also included.<sup>1-3</sup>

The main cancer treatment modalities are surgery, chemotherapy, and radiotherapy depending upon the tumor (location, stage, level of vascularization) to be treated. It is necessary to point out that chemotherapy is, in general, mandatory, as it is a vital clinical procedure used to treat several types of cancer in various clinical protocols. The relevance of this intervention is associated with important effects as to slow down or block the neoplastic cell growth facilitating the management of the disease.<sup>4,5</sup> Chemotherapeutic drugs include actinomycin D, dactinomycin, daunorubicin, doxorubicin, epirubicin, idarubicin, mitomycin C, vinblastine, vindesine, vincristine, vinorelbine, aclacinomycin, cisplatin, docetaxel, liposomal doxorubicin, mitoxantrone, oxaliplatin, paclitaxel, bendamustine, bleomycin, 5-fluorouracil, methotrexate, raltitrexed, asparaginase, bleomycin, bortezomib, cetuximab, cyclophosphamide, cytarabine, eribulin, fludarabine, gemcitabine, ifosfamide, melphalan, rituximab, and trastuzumab. These intravenously administered drugs can be classified into five categories as vesicant, exfoliants, irritants, inflammitants, and neutrals according to their damage potential.<sup>6</sup>

The first aspect pointed out by experts is that it is the right of patients to be informed by the doctors and health professionals about all possible side effects of the clinical interventions before and during the management of the cancer. In almost all the situations, cancer cells, that are abnormal cells, grow and spread quickly in comparison with the normal cells.<sup>4,5</sup> Chemotherapy is designed with the purpose of decreasing or blocking the uncontrolled division of cancer cells. However, during the process of chemotherapy, the chemicals can involve also target various normal cells of the body, including cells involved in the generation of hair, leading to the hair loss.<sup>4,5</sup> Besides the undesirable consequence related to the hair (hair loss) that occurs during chemotherapy, other side effects, as pain, fatigue, sleep disturbance, nausea, vomiting, weight loss and decrease of the blood cells can be also observed. It is necessary to point out that relatively simple actions might mitigate some of the side effects. This can aid in increasing the self-esteem and add to the benefits of the treatment.<sup>4,5</sup>

Considering a paramount effect, Figure 1 shows that hair loss in various parts of the body associated with chemotherapy. Moreover, undesirable conditions such as scalp pain, itch-

ing, or tenderness associated with the hair loss have also been reported. In consequence, naturally, besides the physical discomforts, these effects on the scalp associated with chemotherapy compromise the aesthetics of the individual. This can contribute to emotion distressing often observed in individuals with hair loss.<sup>4,5</sup>



Considering hair loss due to the chemotherapy, it is important to point out that (i) hair fall can start from up to one to four weeks after the beginning of the drug intervention, (ii) the quantity of hair that is lost can vary, depending on the type and quantity of drugs, (iii) the perception of the fall of the hair occurs due the clumps of hair in the hair brush or in the washes of it. Putting together all these reflections, it is important to plan strategies to try to avoid or minimize the distress or to protect the scalp due to the hair loss before starting chemotherapy.<sup>4,5</sup>

Pertaining to the aesthetic aspects, before chemotherapy the individuals can select a wig to wear whenever desirable. This makes it easier to find a wig with a specific hair color and texture suitable to the person. Moreover, there are other options, as to wear, a head scarf, caps or turban.<sup>4,5</sup>

Coming to protection, it is mandatory to use a sunscreen with proper sun protection factor (SPF) on the body and head. Furthermore, it is relevant to wear a hat or to cover the head to protect the scalp whenever the individual is exposed to the sun. There are some hats that have a solar protection and it could be a suitable alternative. In some cases, the individuals live in cold regions where a hat or scarf would also be recommended. Naturally, the wig, scarf or turbans are also important in protection besides the aesthetic approaches.<sup>4,5</sup>

About the strategies to prevent or to reduce the amount of hair loss, scalp cooling or scalp hypothermia are suggested. It is suggested that these techniques would decrease the blood circulation in the scalp and, consequently, the concentration of chemotherapeutics. It is necessary to consider that the hair cannot grow back fully, and it may have a different texture or color than the original hair before the chemotherapy.<sup>4,5</sup>

It is also necessary to know that when hair begins to grow back, it will be, in general, fragile. Therefore, special care must be taken.<sup>4,5</sup> In consequence, it is important to avoid treatments involving the use of harsh or strong chemical products. A professional cosmetologist or trichologist could aid to in selecting a suitable product in such cases.

Since the importance of hair to an individual is indispensable, this has stimulated a large number of investigations in the world. This fact can be verified by the total number of publications in the databank PubMed (on September 23<sup>rd</sup>, 2017) with the keywords “hair”, that is around 79,492 and 4,161 papers with “hair loss”. Table 1 shows the increase in number of publications along the time in the last ten years. Furthermore, the percentage of the publication in these years corresponds to about 52% of the total of the publications with “hair loss” and 37% with “hair”. This indicates a strong recent interest in the hair that could be associated with the aesthetic approaches, consequently improving the QoL and self-esteem. The strong scientific interest in these subjects, demonstrate the relevance of hair to human beings. Different kinds of researches have been carried out in the world to try and understand more about this no peripheral component, that has such importance in the well-being of people.

In conclusion, there is a possible dramatic distress due to chemotherapy related to aesthetics in consequence of the hair loss. However, it is imperative to define a basic approach about this undesirable effect due to the intervention with drugs and the importance to know more about the side effects. Furthermore, it is necessary to know about the protection against undesirable effects due to the sun and the cold air. The hair loss due to the chemotherapy, in general, is a temporary side effect, and normally, hair will

Year	Hair loss	Hair
2017	283	2,755
2016	307	3,426
2015	242	3,398
2014	245	3,272
2013	278	3,279
2012	184	3,019
2011	185	2,869
2010	154	2,530
2009	152	2,534
2008	136	2,343

begin to grow back several months after the chemotherapy is stopped. Moreover, the benefits of chemotherapy must be considered by the oncological subjects. In addition, it is relevant to reinforce the meaningful of the early diagnosis of the cancer.

#### CONFLICTS OF INTEREST

The authors declare that they have no conflicts of interest.

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