DRUGS AND DEVICES IN PREVENTION AND TREATMENT OF CHEMOTHERAPY-INDUCED ALOPECIA: WHEN AND HOW SHOULD BE EMPLOYED

CARO G, ROSSI A., FORTUNA MC., PIGLIACELLI F., D'ARINO A., CARLESIMO M.

BACKGROUND

Incidence of chemotherapy-induced alopecia (CIA): 65% [1].

Different shedding patterns :

- mild-moderate damage→telogen effluvium;
- severe damage→dystrophic anagen effluvium

No guidelines available for prevention and treatment

Our aim: analyze drugs and devices proposed in literature; giving our evidenced based opinion

Classical anticancer drugs are cytotoxic

- Main target→rapidly proliferating cells (hair follicle matrix keratinocytes in anagen phase; pigmentary system)
- Protect from chemotherapy toxicity→ Catagen and telogen phases (lower mitotic rate)

SCALP COOLING

How: local vasoconstriction and reduction of drug inflow to the hair follicles (by cold)

Reported results: CIA prevention rates 50-80%

Approved: ☒yes ☐no

Compliance: ☒high ☐low

Side effects: headache, discomfort, nausea and xerosis

Limitation: action limited to the application time not prevention of toxic effects occurring during the weeks from an infusion to another.

Unreccomandations: platinum derivatives (limited tolerance to cold); hematological tumors (risk of scalp metastasis); concomitant cold agglutinin disease, cryoglobulinemia, and posttraumatic cold injury. [2]

Our opinion: recommended for CIA prevention

TOPICAL VASOCONSTRICTORS EPINEPHRINE AND NOREPINEPHRINE

How: local vasoconstriction and reduction of drug inflow to the hair follicles (by drug)

Reported results: studies on mice

Approved: ☐yes ☒no

Compliance: ☐high ☐low ☒to be evaluated

Side effects: to be evaluated

Limitations: application three times a day

Unreccomandations: hematological tumors (risk of scalp metastasis)

Advantages: action extended also during the weeks from an infusion to another; possible use with platinum derivatives, concomitant cold agglutinin disease, cryoglobulinemia, and posttraumatic cold injury. [3]

Our opinion: recommended for CIA prevention

TOPICAL MINOXIDIL 2% AND 5%

How:

- Vasodilatation (by action on peripheral arteries)→slowing down of circulation→greater permanence of the anticancer drug around the hair follicle
- Induction of angiogenesis (upregulating VEGF)
- Activation of prostaglandin-endoperoxidase synthetase 1→hair growth stimulation [4].

Final effect→shorten telogen phase and extend anagen phase

Reported results: CIA development in 88% (minoxidil 2%) and 92% (minoxidil 5%); shortening the period of baldness

Approved: ☐yes ☒no

Compliance: ☒high ☐low

Side effects: scalp pruritus, scalp folliculitis, facial hair growth

Our opinion: not recommended for CIA prevention (clinical inefficacy; lack of a scientific rationale)

TOPICAL BIMATOPROST 0.03%

How: prostaglandin analogue, protects follicles in anagen phase and improves follicular growth in anagen

Reported results: clinical improvement in 37.5% of patients versus 18.5% of controls

Approved: ☐yes ☒no

Compliance: ☒high ☐low

Side effects: not reported

Our opinion: not recommended for CIA prevention (clinical inefficacy; lack of a scientific rationale)

→ We suggest: use after chemotherapy discontinuation for a greater regrowth (better moment for introduction evaluated considering chemotherapeutic drugs half-life and monitoring scalp with trichoscopy and trichogram [3])

CONCLUSIONS AND PRACTICAL ADVICE

Excluding scalp cooling, we actually have no effective drugs for CIA prevention.

Trichoscopy and trichogram could drive the treatment.

- Numerous black dots and flame hair: index of an acute and severe insult→Use scalp cooling or topical vasoconstrictors
- Pohl pinkus: mitotic activity is not completely interrupted→Use scalp cooling or topical vasoconstrictors when insult is higher
- Numerous yellow dots: follicle are protected by acute damage. Delayed hypoxic insult could induce neogenesis of Hair Follicle Stem Cells (HFSC)→indiscriminate use of scalp cooling and vasoconstrictors could be harmful if other chemotherapy cycles are expected

1. ROSSI A, CATERINA FORTUNA M, CARO G, CARDONE M, GARELLI V, GRASSI S, CARLESIMO M. MONITORING CHEMOTHERAPY-INDUCED ALOPECIA WITH TRICHOSCOPY. J COSMET DERMATOL. 2018 JUL 11
2. REED WPM, VAN DEN HURK CJG, PEERBOOMS M. PRESENTATION, IMPACT AND PREVENTION OF CHEMOTHERAPY-INDUCED HAIR LOSS: SCALP COOLING POTENTIALS AND LIMITATIONS. EXPERT REVIEW OF DERMATOLOGY. 2011;6(1):109-125.
3. SOREF CM, FAHL WE. A NEW STRATEGY TO PREVENT CHEMOTHERAPY AND RADIOTHERAPY-INDUCED ALOPECIA USING TOPICALLY APPLIED VASOCONSTRICTOR. INT J CANCER. 2015;136(1):195-203
4. ROSSI A, ANZALONE A, FORTUNA MC, CARO G, GARELLI V, PRANTEDA G, CARLESIMO M. MULTI-THERAPIES IN ANDROGENETIC ALOPECIA: REVIEW AND CLINICAL EXPERIENCES. DERMATOL THER. 2016 NOV;29(6):424-432. EPUB 2016 JUL 18.