



Use of non-ionizing radiation in beauty care

Pasi Orreveteläinen, Head of Laboratory

Contents

- Introduction
- Electromagnetic fields
- Optical radiation
- Ultrasound
- Legislation in Finland
- Other aspects

Introduction

- Wide range of non-ionizing radiation (NIR) is used in beauty care
- The use of non-ionizing radiation in beauty care is very popular
- Main appliances utilize radio frequencies, optical radiation or ultrasound
- Associated health risks are significant

Electromagnetic fields – radio frequencies

- Appliances utilize radiofrequencies between circa 300 kHz to 10 MHz
- Purpose is to warm or heat the subcutaneous tissue
- Main risks are associated with heat, which may cause damage to the skin or subcutaneous tissue
 - Applied power is too high
 - Treatment head is kept in one position or moved too slowly
 - Treatment time is too long
- Safe use requires proper training and experience

Optical radiation – lasers and intense pulsed light (IPL)

- Used for tattoo removal (lasers only), skin rejuvenation, various skin treatments, ...
- Risks of skin burn, scarring, hyper or hypopigmentation, ...
- Lasers have to be classified according to standard EN 60825-1
- In Finland class 4 lasers (highest class) are not permitted to be used by cosmetologists
 - Exceeds the exposure limit for skin
 - Also some class 3B lasers exceed the exposure limit -> case by case evaluation
- IPLs have no classification system
- Practically all IPL appliances exceed the exposure limit, but a five year transition period was given for these appliances when the limit was introduced in December 2018

Ultrasound

- Various appliances ranging from skin cleansers to high intense focussed ultrasound
- Highest risks associated with appliances either focussing the beam or having the ability to generate cavitation
 - Focussing induces very high intensities causing intentional tissue damage right below skin surface
 - Cavitation is a phenomena where gas bubbles are created in liquid
 - Caused by rapid changes of pressure, eventually leading to intense shock waves
 - Usually low frequencies applied -> deep penetration into body
 - Does the operator of the application really understand what risks are involved?
 - Should these appliances be banned from cosmetologists and left to medical professionals?
- Milder intensities can be used safely
 - However, eyes are very sensitive to ultrasound

Legislation in Finland

- Radiation legislation was renewed in December 2018
 - Exposure limits are based on ICNIRP recommendations
- Beauty care applications and the use of NIR are specifically taken into account
 - Relaxations have been given to beauty care treatments
- Additional requirements
 - Customers have to be informed about the associated health risks
 - Proper contraindications shall be defined and taken into account
- Permission to exceed exposure limits
 - Requires that the safety of use is demonstrated
 - STUK evaluates whether the demonstrated safety claim is valid
 - So far no proposals have been presented

Other aspects

- Legislation is not harmonized between countries
- Lack of safety standards that takes into account the safety of use
- Manufacturers of appliances may consider the situation confusing
- Authorities may have difficulties to cope with the vast range of appliances
 - Need to follow the development, ensure the safety, propose legislative actions, participation in standardization, ...

