LASER WAVELENGTHS IN OPHTHALMOLOGY: A CRITICAL REVIEW

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Laser-tissue interactions, including histological and molecular studies, associated with the solid state laser wavelengths (210-213 nm) and the excimer laser wavelength (193 nm) are compared and contrasted.

ABlation rates

- Excimer: 213 nm is weakly absorbed by aqueous solutions (Dao et al., 1995). The 193 nm wavelength is only slightly absorbed by aqueous solutions (Dao et al., 1995). The 193 nm wavelength has a higher absorption coefficient in aqueous solutions (Dao et al., 1995).

CTYOTOXICITY & MUTAGENICITY

- Clinical acceptance of excimer laser isolation depends upon assessment of potential laser induced carcinogenicity, mutagenicity, and cytotoxicity.

RESULTS

- No significant difference of SLCs level between 819 nm and 193 nm (p<0.005).
- For 193 & 213 nm: less than 5% (av.) of cells formed UDS.
- Highly significant difference of SLCs level between the 266 nm treated cells to that of both the 193 nm and the 213 nm treated cells (p<0.05).

CONCLUSION

- Corneal ablations with 193 or 213 nm produce minimal DNA damage.
- Whereas, the 266 nm wavelength causes significant DNA damage.

FREE RADICAL PRODUCTION


REFERENCES


Kaido et al. (2001) used a narrowband 213nm mirror to separate the beams, which can also reflect up to 5% of the light into the cornea (Tai et al., 1997). Their results showed that 266nm radiation was more cytotoxic and mutagenic than 193nm.

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FREE RADICAL PRODUCTION

- Freer radicals are highly reactive molecules that have been linked to cancer.

- A correlation balance of the radicals is required for cell viability and prevents tissue inflammatory and a chromosomal imbalance in DNA (Kasetsuwan et al., 1999).

- In vivo experiment has been performed for both 193nm and 266 nm lasers (Ediger et al., 1997).

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