**Visible Light-Mediated DNA Damage**
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**Introduction**
Radical cleavage of DNA and RNA has been proven useful in studying the structures of these biological complexes.

Light-dependent radical cleavage is desirable because initiation and termination of radical production can be controlled.

Compounds used for generating radicals in a light-mediated fashion require absorption of relatively high energy UV light.

UV light is absorbed by DNA bases causing damage.

Methylcobalamin and other alkylcobalamins are known to undergo photolysis to generate methyl radicals upon exposure to green light (530 – 580 nm).

Green light is not absorbed by DNA bases.

We anticipated that methylcobalamin in combination with green light would cause DNA cleavage without damage due to the light.

**Light-dependent DNA Damage by Methylcobalamin**

**Scheme 1.**
A) Methylcobalamin; (B) Cartoon of spermine-alkylcobalamin conjugate (1) binding to DNA; C) Light-mediated DNA cleavage by methylcobalamin.

**Fig. 1.** Light-mediated DNA cleavage dependence on MeCbl concentration.

**Fig. 2.** DNA cleavage by MeCbl dependence on light exposure.

**Conclusions**

Our results show that methylcobalamin, an alkylcobalamin, cleaves DNA in a green light-mediated manner.

DNA strand scission results from the generation of methyl radicals.

Green light does not damage DNA; in contrast to UV light.

Conjugation to a DNA binding agent, spermine, improved the ability of alkylcobalamins to cause DNA damage.

We anticipate that this could be useful for researchers studying DNA and RNA structure.

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