Ultraviolet Transilluminator Safety

Introduction
Ultraviolet (UV) transilluminators are commonly used to visualise fluorescent markers used in gel electrophoresis of nucleic acids and proteins, they usually consist of a UV light source and associated electronics housed in a box with appropriate optical filters. There should be a light transmitting cover with UV filter that transmits visible light to allow gels to be viewed. Exposure to UV commonly occurs when users visualise gels to cut and remove specific bands.

The Hazard
Transilluminators produce ultraviolet radiation (commonly between 302nm and 365nm) which can cause damage to human tissue in the eyes and skin.

Risks from Transilluminator UV radiation
Transilluminators have the potential effects on eyes (photokeratitis, photoconjunctivitis and cataracts) and skin erythema (sunburn like condition) elastosis (photoaging and skin cancer). Hands, arms, face and eyes are likely sites of injury. Working unprotected for even a few minutes can cause injury. Some individuals have greater than usual photosensitivity. Effects of UV can occur within a short period (photokeratitis and erythema) or a long period after exposure (skin cancer). It is possible to calculate acute threshold for acute effects and therefore set exposure limits, however it is not possible to do so for chronic effects, therefore there is no safe exposure level and exposure should be reduced as much as possible.

Control
The manufacturer’s specification should be consulted for information as to the potential exposure level and frequency of radiation and their suggested operating protocols. The time weighted exposure limits should also be found there.

Substitution of UV for safer frequency
Alternative systems of visualisation, such as blue light fluorescence must be considered. They have the advantage that although filter glasses are generally worn to remove background light and enhance contrast there is no more hazard than any other bright visible light source.

Guarding
UV transilluminators should be guarded (enclosed in an absorbent polymer) with an interlock that will make the device safe (i.e. turn it off) if the guard is opened.
Eye and skin exposure should be avoided, alternatives to manipulating gels with hands whilst under UV should be found.

Administrative Controls
People using transilluminators should be trained to understand the risk, know the correct operating procedures and actions to be avoided.
Old transilluminators that are not interlocked should be disposed of and replaced with CE compliant alternatives.
Personal Protective Equipment (PPE)

**Skin**
Laboratory coats and long sleeved clothing serve to protect the skin. Care should be taken to avoid gaps where skin is exposed.

**Hands**
PPE in the form of gloves may be appropriate (transmission of about 10% for some brands of nitrile gloves has been measured) but the absorbance of the gloves, in both relaxed and stretched conditions, plus the irradiance of the UV source will be needed to calculate the resultant exposure.

**Eyes**
Appropriate glasses and face visor should be worn if there is any risk of exposure.

**Do and don’t advice for users of the equipment**

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<th>Do</th>
<th>Don’t</th>
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<tr>
<td>Do read the manufacturer’s instructions.</td>
<td>Don’t expose other people to UV radiation due to your activities.</td>
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<td>Do follow the controls in risk assessments for the procedure you are performing.</td>
<td>Don’t modify the equipment.</td>
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<td>Do wear protective clothing if there is a risk of harmful exposure.</td>
<td>Don’t remove covers.</td>
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<td>Do avoid unnecessary exposure to eyes or skin. There is no safe exposure level to avoid skin cancer.</td>
<td>Don’t defeat interlocks.</td>
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<td>Don’t use the transilluminators for purposes other than intended.</td>
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Safety Services Reference(s):

- Ultraviolet Transilluminator
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