

Translated from *Rev Prescrire* **March 2007; 27 (281): 191-192**

Aluminium-containing transdermal patches: a risk of burns

- **The waterproof outer layer protecting some transdermal patches is composed of aluminium. This creates a risk of burns, especially when the patient is exposed to electric shocks or intense magnetic fields.**

- **External electrical shocks delivered by a defibrillator for example can create electrical arcing between the electrode and the aluminium layer of the patch, potentially causing burns.**

- **During Magnetic Resonance Imaging (MRI) the aluminium present in these patches, which is not ferromagnetic, creates electrical resistance (by induction), and can sometimes cause second-degree burns.**

- **Patients undergoing MRI or defibrillation should first be examined for patches containing aluminium. Such patches can generally be identified by examining the backing, which is shiny and reflects light if aluminium is present.**

- **If in doubt it is best to temporarily remove all transdermal patches before MRI or external defibrillation.**

- **Packaging of transdermal patches that contain conductive materials should include more explicit warnings.**

Rev Prescrire **March 2007; 27 (281): 191-192.**

There is a risk of burns with transdermal patches containing an aluminium layer, especially when the patient is exposed to an electric shock (defibrillation) or an intense magnetic field (**a**). Precautions must therefore be taken during external electric shock therapy and Magnetic Resonance Imaging (MRI).

Defibrillation: risk of electrical arcing. Several authors have reported explosions, with detonations, flashes or smoke, during external defibrillation on patients wearing patches on their torso (1-3). One patient had first-degree burns (3).

Similar cases have been reported with trinitrine ointments (alias nitroglycerin) and with some gels for electrodes (1,2). In these cases, however, experiments showed that the explosive phenomena were due to the conductive nature of the excipient (1,2). They were caused by electrical arcing between the paddle of the external defibrillator and the aluminium layer of the patch (1-3).

The warning on Nitriderm TTS° patch leaflets, which contain trinitrine, makes sense. However, there is no need to extend the same warning to patches without an aluminium layer since trinitine is not implicated, as the phenomenon is electrical, not chemical.

MRI: risk of burns by induction. During MRI, metallic objects with ferromagnetic properties within the perimeter of the magnetic field are violently drawn to the MRI device and can injure the patient (4).

The radiomagnetic waves created by an MRI unit can also induce electrical currents capable of heating an implanted metallic device, justifying certain contraindications for MRIs (5,6).

The aluminium present in some patches is not ferromagnetic but acts as an electrical heating conductor (7). Reports in the United States mention second-degree burns in patients wearing aluminium-containing patches during MRI (8-10).

Caution needed to prevent burns. Several ranges of transdermal patches containing a protective aluminium layer are marketed in France, including Nitriderm TTS° (trinitrine), Scopoderm TTS° (scopolamine), and Neupro° (rotigotine) (**b**).

Unless one is sure that a transdermal patch does not contain conductive material, it is best to remove it before MRI and, if circumstances allow, before external defibrillation (8-12). The patch should then be reapplied or replaced, according to the basic rules for handling patches (especially handwashing and disposal) (13-15).

The presence of an aluminium layer is not clearly mentioned on the labeling, but it can generally be detected simply by examining the adhesive surface: if it is shiny and reflects light, the patch contains an aluminium layer.

Action. Transdermal patches containing conductive materials such as aluminium require special precautions compared to patches not containing these materials (16).

It may not be easy to remember this in emergency situations; patients and caregivers would therefore benefit from a clear printed warning.

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a- Patches are adhesive devices applied to the skin that release an active substance into the circulation. A patch is composed of various layers with specific functions, including an outer protective layer (normally waterproof), a reservoir or matrix containing the active substance (sometimes at a high dose), a membrane regulating the release of the active substance in some devices, and an adhesive layer covering either the whole surface or just around the edges; new patches are packaged in a protective envelope that is removed before use (ref 17).

b- The summary of product characteristics (SPC) for Nitriderm TTS° (but not for Scopoderm TTS°) recommends removing the patch before electric shock therapy (ref 18).

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