

# 3M™ COBAN™ 2 Compression

# made easy

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## Introduction

The 3M™ Coban™ 2 Compression System is designed to address some of the problems that may be associated with multi-component compression systems, eg two- or four-layer bandaging, or compression hosiery. This system has two layers, is quick and easy to apply<sup>1</sup> and produces effective, consistent pressure that effectively manages oedema<sup>2-4</sup>. The 3M™ Coban™ 2 Compression System also demonstrates reduced slippage<sup>5</sup> and is suitable for a wide range of patients<sup>6</sup>. This article describes why, when and how to effectively and safely use this system.

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## Challenges associated with compression therapy

When compression therapy is indicated, clinicians need to ensure that it is applied in a way that will safely deliver sufficient pressure to reduce oedema without causing pressure damage<sup>7</sup>. Clinicians need to be knowledgeable of the features of the different bandage systems and their appropriate use. In addition, they require training and should have demonstrated competency in the bandage application technique for the system in use<sup>8</sup>.

### Non-compliance

Non-compliance with compression therapy in patients with venous leg ulceration is a recurring problem<sup>9</sup>. In a study of 150 patients with venous insufficiency, less than half of patients reported full compliance with compression therapy<sup>10</sup>. A recent review found that poor concordance with compression therapy reduces venous leg ulcer healing rate, doubling the time to complete healing<sup>11</sup>. A wide variety of physical and psychosocial factors have been identified as contributing to non-compliance<sup>12,13</sup>. For example, patients may choose to remove the bandages if they are associated with pain, make the patient feel too hot, slip down, or are too bulky to wear with the patient's usual shoes or clothes<sup>12</sup>. Removal of the bandages may result in an interruption to therapy, and has the potential to delay wound healing.

## What are the properties of the ideal compression system?

The ideal compression system enables clinicians to deliver effective compression with a low complication rate (Box 1).

### Box 1 Properties of the ideal compression system (adapted from<sup>7,14</sup>)

- Proven clinical effectiveness
- Delivers tolerable sustained compression during rest and high pressure peaks during walking
- Enhances calf muscle pump function
- Easy application encourages safe, accurate and consistent application
- Non-slip and likely to stay in place until next bandage application
- Comfortable and can be adapted to cope with limb distortion
- Comfortable and allows the patient to mobilise and to wear appropriate footwear and clothing
- Non-allergenic
- Durable

## What is the 3M™ Coban™ 2 Compression System?

The 3M™ Coban™ 2 Compression System is a two-layer compression bandage system that is easier to apply and less bulky than traditional four-layer bandage systems. There are two forms of the system: 3M™ Coban™ 2 and 3M™ Coban™ 2 Lite.

The inner latex-free foam sheet of both products is identical. It has a cohesive backing, is applied foam side to the skin and is highly conformable, ie will mould to the shape of the leg easily. The cohesive backing has adhesive properties that enable it to attach to the outer layer of the compression system across its whole surface to form a stable, effective compression system. The outer layer is a short stretch cohesive bandage that is applied over the inner layer to provide compression. It interlocks with the inner layer creating an inelastic bandage system that is less likely to slip down the leg during wear. The outer layer of 3M™ Coban™ 2 Lite is different in appearance to that of 3M™ Coban™ 2, and allows lower resting pressures, but similar working pressures to 3M™ Coban™ 2.

Part of the inspiration for designing the 3M™ Coban™ 2 Compression System to be inelastic came from examining the properties of giraffe skin. It is known that the fibrous, inelastic skin of giraffes helps to explain why they do not experience skin changes as a result of venous hypertension<sup>15</sup>.

## Clinical evidence for the 3M™ Coban™ 2 Compression System

Compression therapy is considered the gold standard of care for treating venous hypertension and venous ulceration<sup>16</sup>. A Cochrane review of compression therapy for venous leg ulcers concluded that venous ulcers heal more rapidly when compression is used than when it is not<sup>17</sup>. Box 2 (see page 2) details the mechanisms of action of compression therapy in reducing oedema and aiding healing of venous leg ulceration.

The studies demonstrating the effectiveness and patient acceptability of the 3M™ Coban™ 2 Compression System are summarised in Table 1 (see page 5). These studies have

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demonstrated that 3M™ Coban™ 2 Compression System:

- provides effective, therapeutic compression for the treatment of venous leg ulcers<sup>4, 24-25</sup>
- has reduced slippage<sup>5</sup>
- improves health-related quality of life<sup>5</sup>
- is safe, well-tolerated and comfortable<sup>2,5</sup>, and preferred by patients in comparison with a four-layer system<sup>5</sup>.

## How does the system provide effective compression?

### Enhanced calf muscle pump

The two interlocking layers of 3M™ Coban™ 2 together produce a relatively stiff inelastic sleeve that resists being stretched when the calf muscle expands as it contracts during movement.

The effect of this resistance by the sleeve to muscle expansion during muscle contraction is to produce peaks in pressure under the sleeve and within the calf muscle during movement (working pressure) (Figure 1).

Since the compression sleeve does not give way when the muscle contracts, intermittent pressure peaks can be registered under the bandage, reflecting a massaging effect on the leg during walking. As the muscle relaxes between contractions, the pressure drops producing the variation in pressure amplitude during movement. The pressure peaks cause intermittent 'squeezing' of the veins and muscles that enhances venous return and calf muscle pump function.

3M™ Coban™ 2 Lite also produces spikes in pressure during movement, but because it has fewer elastic fibres than 3M™ Coban™ 2, when it is applied with comparable stretch, it produces a resting pressure that is 25% lower. This reduces the risk of pressure damage and so makes it more suitable for patients who have arterial occlusive disease (ABPI 0.5–0.8) or reduced tolerance for compression.

### Effective compression at rest

After application of the cohesive layer of 3M™ Coban™ 2 at full-stretch, a resting pressure of more than 40mmHg can be

### Box 2 How does compression therapy reduce oedema and heal leg ulcers?

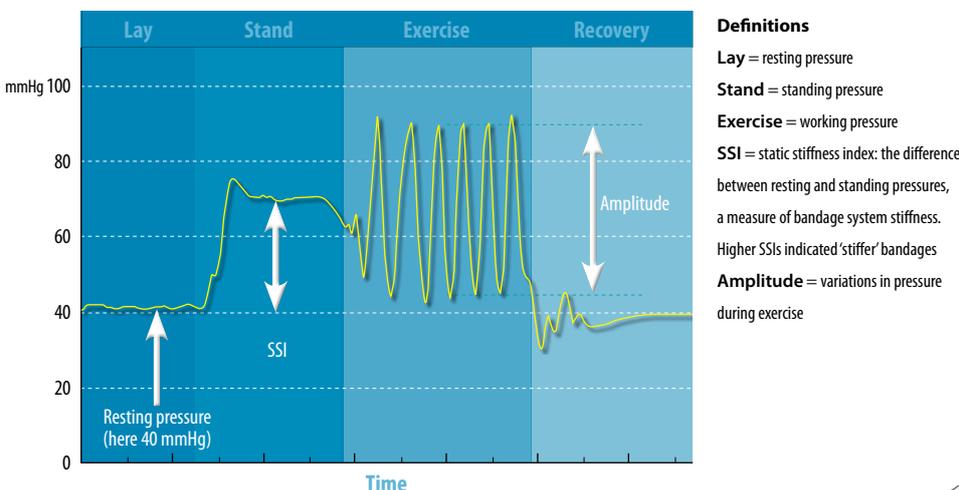
The effect of compression therapy is to squeeze the limb, and so to reduce oedema by:

- reducing the diameter of major veins and consequently local blood volume<sup>18</sup>
- aiding venous return of blood to the heart by improving calf muscle pump action<sup>19</sup>
- reducing the formation of excess interstitial fluid<sup>20</sup>
- improving the microcirculation and tissue oxygenation<sup>18</sup>
- enhancing lymphatic function<sup>20</sup>
- removing and decreasing production of proteases and inflammatory cytokines in the wound microenvironment<sup>21</sup>.

In venous leg ulceration, the underlying pathophysiology is assumed to be a result of venous hypertension resulting in chronic venous insufficiency<sup>22</sup>. Venous hypertension increases capillary permeability resulting in tissue oedema and a number of biochemical and physiological effects that may contribute to cell damage, tissue breakdown and the formation of venous leg ulcers<sup>16,18,23</sup>. It is thought that the same mechanisms may also hinder tissue repair. Compression improves venous return and reduces oedema, which will aid healing.

delivered. On standing, both 3M™ Coban™ 2 and 3M™ Coban™ 2 Lite will produce a pressure of more than 60mmHg (see Figure 1), which is the level accepted as the pressure required to counteract venous hydrostatic pressure in the lower leg<sup>20,26</sup>.

Figure 1 Pressure changes under the 3M™ Coban™ 2 Compression System



## What makes the bandage system easy to apply?

3M™ Coban™ 2 and 3M™ Coban™ 2 Lite each have only two layers and the outer layer is designed to be applied at full stretch. This simplifies application: there are fewer layers to apply and there is less uncertainty in obtaining the correct tension to achieve the desired pressure.

In an international multicentre study 32 expert bandagers applied the bandage they used the most to an artificial limb over pressure sensors three times and repeated the process with 3M™ Coban™ 2. The bandagers were found to apply 3M™ Coban™ 2 at more consistent

pressures than the other systems<sup>1</sup>. In addition, participants found 3M™ Coban™ 2 application to be fast and easy to learn<sup>1</sup>.

## How does the 3M™ Coban™ 2 Compression System avoid slippage?

Ideally, a compression bandage system should stay in place for the duration of wear because slippage will result in a failure to deliver compression. However, bandages may slip down the limb becoming bunched and uncomfortable, so losing some compressive ability<sup>5,20</sup>.

When the inner foam layer of 3M™ Coban™ 2 and 3M™ Coban™ 2 Lite is compressed, the system holds on to the skin, and prevents slippage. After application, the inner layer provides a cohesive surface for the attachment of the outer compression layer. The two layers lock together to create an inelastic sleeve that conforms to the limb and reduces the potential for slippage and bunching.

A laboratory study of 10 different compression systems assessed slippage over 48 hours of wear in 60 healthy volunteers<sup>27</sup>. 3M™ Coban™ 2 and 3M™ Coban™ 2 Lite were shown to have the lowest slippage and were the most effective in maintaining resting pressures and amplitudes at values known to be effective for ulcer healing<sup>27</sup> (Figure 2).

A clinical study in patients with venous leg ulcers found that slippage measured at each bandage change was significantly lower for 3M™ Coban™ 2 when compared with a four-layer bandage system<sup>5</sup>.

### Box 3 Why select the 3M™ Coban™ 2 Compression System?

3M™ Coban™ 2:

- is a two-layer inelastic compression system that is quick and easy to apply<sup>1</sup>
- provides effective compression<sup>2-4</sup>
- is less likely to slip than other multi-component bandage systems<sup>5</sup>
- is suitable for a wide range of patients<sup>6</sup>.

3M™ Coban™ 2 Lite has similar benefits and in addition can be applied with a 25% reduction in resting pressure reducing the likelihood of pressure damage and non-concordance in patients who have arterial disease (ABPI 0.5–0.8), are frail or less mobile, or who have unknown tolerance to compression therapy.

### Box 4 Contraindications/precautions

- Clinicians should ensure that the patient has an adequate arterial blood supply before applying either compression system. If the patient's ABPI is <0.8, 3M™ Coban™ 2 should not be used. If the patient's ABPI is ≥0.5, 3M™ Coban™ 2 Lite may be used<sup>6</sup>
- 3M™ Coban™ 2 and 3M™ Coban™ 2 Lite are not designed to be used as a wound dressing.

## Indications for 3M™ Coban™ 2

3M™ Coban™ 2 is suitable for most patients with venous leg ulcers, lymphoedema and other conditions where compression therapy is appropriate, and for patients with different limb sizes and shapes<sup>6</sup> (Box 3). It is important to ensure adequate arterial blood flow before applying 3M™ Coban™ 2 (Box 4).

## Indications for 3M™ Coban™ 2 Lite

3M™ Coban™ 2 Lite achieves a lower resting pressure than 3M™ Coban™ 2. As a result, it is more comfortable for patients less tolerant of compression therapy (Box 3), including those who:

- have a leg ulcer of mixed aetiology with an ABPI ≥ 0.5
- are new to compression and have unknown tolerance for compression
- are frail or less mobile<sup>6</sup>.

3M™ Coban™ 2 Lite reduces the risk of tissue damage and necrosis when compression therapy is considered necessary in patients with an ABPI between 0.5 and 0.8<sup>6</sup> (Box 4). Even so, careful observation for early signs of skin damage remains a requirement for the safe management of these patients.

## Clinical practice points

### Prior to application

Wounds should be managed with dressings appropriate to the wound condition. The decision to use 3M™ Coban™ 2 or 3M™ Coban™ 2 Lite will be guided by full clinical assessment, including assessment of peripheral arterial circulation (ABPI) (see Box 4) and the patient's ability to tolerate compression.

### Box 5 Basic application and removal technique for the 3M™ Coban™ 2 Compression System

#### Application

- Apply the inner foam layer with the foot dorsiflexed and starting at the base of the fifth metatarsal head. Leaving the bottom of the heel exposed, proceed by winding the foam up the leg using minimal overlap to just below the fibular head. Cut off excess material.
- Apply the compression layer with the foot dorsiflexed and starting at the base of the fifth metatarsal head. Apply at full stretch and proceed up the leg using 50% overlap. The bottom of the heel should be covered with the compression layer.
- End at the fibular head or just below the back of the knee and level with the top edge of the foam layer. Cut off any excess material.
- Gently press and conform the entire surface of the system to ensure that the two layers are firmly bond together.

#### Removal

- 3M™ Coban™ 2 and 3M™ Coban™ 2 Lite may be removed with bandage scissors or by unwrapping each layer. The bandages should not be reused.

(See: 3M™ Coban™ 2 Layer Compression System Application and Removal Techniques<sup>28</sup>)

# PRODUCTS FOR PRACTICE

## Application technique

The technique for 3M™ Coban™ 2 and 3M™ Coban™ 2 Lite is easy to learn and results in comfortable and effective compression during wear. Full details can be found in *3M™ Coban™ 2 Layer Compression System Application and Removal Techniques*<sup>28</sup>.

The outer compressive layer of 3M™ Coban™ 2 and 3M™ Coban™ 2 Lite is designed to be applied at full stretch and requires an application technique that is different from many other systems (Box 5).

## Full stretch application

Full stretch can be determined by stretching the compression layer the few centimetres necessary until it just reaches its limit. This degree of stretch should be maintained throughout the application to the limb. The bandage should not be applied more tightly as this confers no benefit and may cause damage through constriction. If 3M™ Coban™ 2 is not tolerated at full stretch, then 3M™ Coban™ 2 Lite may be applied. It should be noted that compression bandages become more comfortable after a few hours of movement.

The 3M™ Coban™ 2 Compression System can be used on highly contoured or thin legs with minor modifications to the application technique: see *3M™ Coban™ 2 Layer Compression System Application and Removal Techniques*<sup>28</sup> for full details.

## Patients new to compression therapy

Patients new to compression therapy may not initially tolerate pressure levels delivered by multi-component compression systems. However, bandages often become more comfortable after a few hours, especially if the patient is encouraged to walk as much as possible. Should a patient have problems with even 3M™ Coban™ 2 Lite,

then this may initially be applied at less than full stretch, with the intention of increasing the stretch at subsequent bandage changes as tolerance improves.

## When to replace the bandages

3M™ Coban™ 2 and 3M™ Coban™ 2 Lite should be changed if they become loose fitting, no longer conform to the shape of the leg, become soiled with wound drainage, or have been in place for seven days. Care should be taken to keep 3M™ Coban™ 2 and 3M™ Coban™ 2 Lite dry to prevent any wound getting wet and the bandages becoming heavy and uncomfortable.

## When should treatment be discontinued?

If patients experience pain, numbness, tingling, discolouration or swelling of their toes, they should be advised to promptly remove 3M™ Coban™ 2 or 3M™ Coban™ 2 Lite and contact their health care provider.

## What are the economic arguments for using compression systems?

There are a number of challenges

involved when presenting a robust cost-effectiveness argument for any wound management intervention.

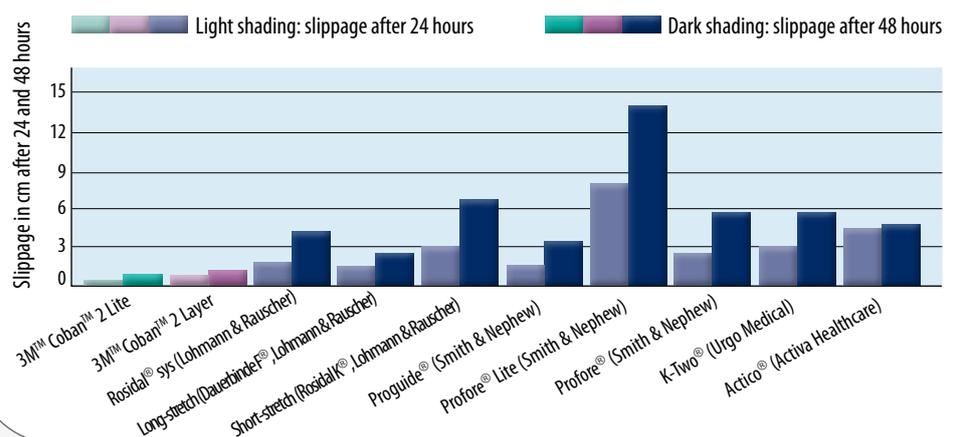
Using a theoretical model, Franks and Posnett (2003) were able to demonstrate that high compression therapy was a cost-effective intervention in the management of venous leg ulcers, with leg ulcer healing as a key clinical outcome<sup>29</sup>.

However, they stressed that a thorough evaluation of the cost-effectiveness of compression therapy systems is awaited<sup>29</sup>.

Romanelli et al assert that factors such as frequency of dressing/bandage change, nursing time, avoidance of ulcer recurrence, cost of care setting and the ability to return to paid employment are factors that should always be considered by clinicians when assessing the cost-effectiveness of treatments<sup>30</sup>.

It is likely that compression systems that are quick and easy to apply, enhance healing of venous leg ulcers, and encourage concordance seem likely to have economic benefits.

Figure 2 Results of a controlled laboratory study measuring slippage of various compression systems<sup>27</sup>



**Table 1 Summary of clinical evidence for the 3M™ Coban™ 2 Compression System**

Study reference	Title	Type	Purpose	Outcomes
Moffatt CJ, Edwards L, Collier M, et al. <i>Int Wound J</i> 2008; 5(2): 267-79 <sup>5</sup>	A randomised eight-week crossover clinical evaluation of the 3M™ Coban™ 2 Compression System versus Profore™ to evaluate the product performance in patients with venous leg ulcers	RCT, eight-week crossover design; 81 patients	To compare systems for slippage, health-related quality of life, patient preference and wound healing	<ul style="list-style-type: none"> <li>There was significantly less slippage after 3–7 days with 3M™ Coban™ 2 (p&lt;0.0001)</li> <li>No significant difference in % wounds that healed or in wound area reduction between the different compression systems</li> <li>72% of patients preferred 3M™ Coban™ 2 over Profore</li> <li>Patient preference was similar regardless of randomisation order</li> </ul>
Hampton S, Kerr A, Crossley M. Data on file. 3M, 2006 <sup>24</sup>	Summary of five case studies on the treatment of venous leg ulcers with a new two layer compression system in a community setting	Case study series following five patients for six weeks	To evaluate clinical acceptability and product performance (slippage and wear time) of 3M™ Coban™ 2	<ul style="list-style-type: none"> <li>3M™ Coban™ 2 was easy to learn and easy to apply</li> <li>The system conformed well to a variety of limb shapes</li> <li>The system was found to be aesthetically pleasing and demonstrated seven day wear time on the majority of patients (minimum wear time four days)</li> <li>The system was never changed as a result of slippage or sagging</li> </ul>
Jünger M, Hasse H, Ladwig A, et al. Data on file. 3M, 2010 <sup>2</sup>	Compression therapy in patients with peripheral arterial occlusive disease: A prospective clinical study with the 3M™ Coban™ 2 Layer Lite Compression System for ABPI≥0.5	Single-centre, open label study of 15 patients with ABPI of 0.5–0.8	To assess safety and tolerability of 3M™ Coban™ 2 Lite in patients with impaired arterial circulation (ABPI 0.5–0.8)	<ul style="list-style-type: none"> <li>3M™ Coban™ 2 Lite was safe and well tolerated by patients with ABPI 0.5-0.8</li> <li>Average supine sub-bandage pressure was 28mmHg immediately after bandage application</li> <li>No pressure-related skin damage occurred and no pain related to tissue hypoxia was reported</li> <li>3M™ Coban™ 2 Lite demonstrated beneficial effects on the microcirculation</li> </ul>
Bain G. Data on file. 3M, 2008 <sup>25</sup>	Evaluation of new bandage system to improve wound healing outcomes for patients with problematic venous leg ulcers	Case study series of eight patients; patients were assessed weekly for four weeks	To measure healing for patients whose venous leg ulcers had not responded to conventional compression bandaging	<ul style="list-style-type: none"> <li>3M™ Coban™ 2 obtained faster reduction in oedema, pain and exudation than the traditional multi-layer compression systems used previously</li> <li>A 30–40% reduction in wound surface area was observed in 6 patients over the four-week trial period; one patient's ulcer was healed by the 6th weekly visit, after two years of non-healing</li> <li>Minimal bandage bulk allowed patients to wear normal shoes</li> </ul>
McGuinness B, Rice J. Data on file. 3M, 2008 <sup>3</sup>	Understanding the clinical and patient outcomes of new bandaging system: summary of four case studies	Case study series of four patients; patients were assessed weekly	To understand effect of dressings on clinical and patient outcomes	<ul style="list-style-type: none"> <li>3M™ Coban™ 2 was comfortable and well tolerated by all patients</li> <li>The persistent leg ulcers of two patients healed within the four-week evaluation period</li> <li>In all cases, considerable oedema reduction was achieved</li> </ul>
Hayes W, Day J. <i>J Wound Care</i> 2007; 3M (Suppl): 1-12 <sup>4</sup>	Evaluating a new and unique two-layer layer compression system for patients with venous leg ulceration	Case study series of four patients; patients were assessed weekly for six weeks	To evaluate clinical acceptance (bandage slippage and wear time), in venous leg ulcer patients treated with 3M™ Coban™ 2	<ul style="list-style-type: none"> <li>3M™ Coban™ 2 provided effective therapeutic levels of compression that patients could tolerate</li> <li>In all cases, wound dimensions reduced during the six-week evaluation period</li> <li>Patients were able to wear their choice of clothing and footwear</li> <li>All patients experienced improved comfort levels and were concordant with treatment</li> </ul>

*Healthcare practitioners are advised to consult the manufacturer's instructions before applying any dressing.*

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## Summary

The 3M™ Coban™ 2 Compression System provides thin, conformable compression that delivers therapeutic levels of compression and has demonstrated clinical efficacy. 3M™ Coban™ 2 and 3M™ Coban™ 2 Lite have only two layers making them quick to apply and the application technique easy to learn. The systems' reduced bulk encourages concordance by allowing patients to wear their usual clothing and footwear.

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