

A HEAT PAD

TECHNICAL FIELD

This invention relates generally to a heat pad and a method for delivering heat to specific
5 body areas of a person.

Background

Thermal therapy has been traditionally used to treat body pains. The physiological effects
of thermal therapy act via nervous, vascular and biophysical pathways. Studies have shown
10 that heat over 40 °C, when applied to the skin near to where internal pain is felt, it switches
on heat receptors located at the site of injury. These heat receptors in turn block the effect of
chemical messengers that cause pain to be detected by the body. Furthermore, when the pain
intensity is high, for example during menstrual cramps, a higher temperature is often
preferred for pain relief. When thermal products are used, there is common concern of
15 injury. Research has shown that at 44 °C, the rate of “injury” and “recovery” almost cancels
each other out. At 44 °C to 51 °C, the rate of burn almost doubles for each degree increase.
This results in many products keeping their thermal range to about 40 °C as a precaution to
causing skin injury. Existing products in the market are typically single use heating pads for
direct-to-skin application for providing low continuous heat for pain relief with a product
20 temperature cap at 40 °C to 45 °C, calibrated in a controlled environment, to avoid the risk
of causing low temperature burns to their users. This translates to a temperature of up to 40
degrees on skin.

When heating elements are made to emit 40 degrees in temperature, confounding factors
25 such as product material, environmental temperature etc, often reduce the actual heat being
transmitted to the skin, thereby reducing the therapeutic effects. Further, continuous
application of heat causes the receptors to be desensitized by the heat level. When
accommodated, the pain receptors are balanced at the very edge of stimulation and the effect
of pain relief is lost.

It is difficult to put a numeric value to temperature by relying on the sense of touch as there are many confounding factors such as varying heat thresholds on different areas of the body, temperature desensitization etc. Yet the indication of heat level is important for prevention of injury when using heating products that are applied to the skin. Disposable air-activated heating products have no visual indication of the product's temperature. Temperature judgment is left to users based on their personal touch sensation. Users are therefore not able to accurately discern temperature levels by touch, especially if the heat from the heating product has been in contact with the skin for a while, causing the heat receptors to be accustomed to the steady heat. Without any measure or indication of heat, users are at higher risks of being scalded.

Chemical air-activated warmers typically limit maximum temperature by varying the ingredient mix ratio inside the pouch, as well as by varying the gaseous permeability of the encapsulating layer. Some reusable electric and non-electric heat pack products utilizes PCM but require external sources of heat such as electricity or hot water bath or microwave oven to provide the heat to be gained & stored by the PCM. Further, the capping of a maximum temperature is attempted by varying ingredient mix and membrane permeability based on theoretical & controlled conditions. Most of the time, the temperature is poorly controlled with large variations in actual maximum temperature as users of heat packs or the like heating products typically do not use them in a controlled environment and in a controlled manner. Users may apply more layers of insulative clothing, apply pressure to the device, or carry out other actions that can cause the maximum temperature to easily exceed the desired maximum. This is undesirable as exceeding the maximum temperature could result in heat injury.

Heating devices and other medicated patches, such as heat pads, are typically designed to ergonomically fit one specific body area, especially when fitting along contours of the body such as the neck and shoulders. When these devices are applied on non-targeted body areas, wastage and poor fitting occurs, thereby decreasing the efficacy of the product in providing heat or substance to the body.

Existing products provide a single continuous patch designed and shaped to ergonomically fit one body area, with secondary applications to other body areas through different wrapping techniques. Some products segment the heating elements into smaller partition to help allow for a more comfortable fit on various body contours. Body shape and sizes can vary greatly. However, existing product designs are unable to accommodate ergonomically for both “small” and “extra-large” body sizes with a single product design. Therefore, there exists a need for a heat pad for addressing the foregoing problems.

10 **Summary**

In accordance with a first aspect of the invention, there is disclosed a method for delivering heat to a target body area of a person. The method comprises providing a heat pad comprising at least one heat cell and a surface, activating the at least one heat cell for generating heat therefrom to elevate the temperature of the heat pad to substantially within an effective temperature range, positioning the surface of the heat pad over the target body area of the person whereto the heat is to be delivered for a first duration, and intermittently displacing the surface of the heat pad away from the target body area after for a second duration before repositioning the surface of the heat pad substantially over the target body area. The intermittent displacement of the heat pad away from the target body area impedes prolong exposure of skin around the target body area to heat within the effective temperature range.

In accordance with a second aspect of the invention, there is disclosed a heat pad for delivering heat to a target body area of a person comprising at least one heat cell and a surface, the at least one heat cell being activatable for generating heat therefrom to elevate the temperature of the heat pad to substantially within an effective temperature range, the surface being shaped and dimensioned for positioning over the target body area of the person whereto the heat is to be delivered for a first duration, wherein intermittently displacing the surface of the heat pad away from the target body area after for a second duration before repositioning the surface of the heat pad substantially over the target body

area impedes prolong exposure of skin around the target body area to heat within the effective temperature range.

5 In accordance with a third aspect of the invention, there is disclosed a heat pad for generating heat to be applied to a target body area of a person. The heat pad comprises at least one heat cell for generating heat therefrom when activated, and a thermochromatic indicator positioned for providing visual indication of temperature based on at least one of presence, absence, position and type of colour.

10 In accordance with a fourth aspect of the invention, there is disclosed a heat pad for generating heat to be applied to a target body area of a person. The heat pad comprises a plurality of heat cells that are activatable for generating heat for elevating temperature of the plurality of heat cells towards a first temperature level, and phase change material (PCM) adapted with at least one of the plurality of heat cells for transitioning from a first phase to a
15 second phase when temperature of the plurality of heat cells exceeds the first temperature level for storing thermal energy generated therefrom. The PCM transitions from the second phase to the first phase when temperature of the plurality of heat cells goes below a second temperature level for releasing thermal energy stored thereby.

20 In accordance with a fifth aspect of the invention, there is disclosed a heat pad for generating heat to be applied over a target body area of a person. The heat pad comprises a plurality of heat cells that are activatable for generating heat for elevating temperature of the plurality of heat cells towards a first temperature level, and a perforated line defined by the heat pad for facilitating tearing of the heat pad along the perforated line for spatially
25 segregating two portions of the heat pad to thereby enable the heat pad to be at least one of shaped and configured for substantially adapting to shape and dimension of the target body area of the person for directing heat generated by the plurality of heat cells thereto, each of the two portions of the heat pad comprising at least one of the plurality of heat cells.

In accordance with a sixth aspect of the invention, there is disclosed a heat pad for generating heat to be applied to a target body area of a person. The heat pad comprises a plurality of heat cells that are activatable for generating heat for elevating temperature of the plurality of heat cells towards a first temperature level, and a plurality of perforated lines defined by the heat pad for facilitating tearing of the heat pad along the plurality of perforated line for spatially segregating a plurality of portions of the heat pad to thereby enable the heat pad to be at least one of shaped and configured for substantially adapting to shape and dimension of the target body area of the person for directing heat generated by the plurality of heat cells thereto, each of the plurality of portions of the heat pad comprising at least one of the plurality of heat cells.

Brief Description of the Drawings

FIG. 1 shows a partial plan view of an exemplary heat pad with two heat cells according to an aspect of the invention being manipulated by a hand of a user;

FIG. 2 shows process flow diagram of a heat delivery method according to another aspect of the invention for utilizing the heat pad of FIG. 1;

FIG. 3 shows a partial front sectional view of the heat cell of the heat pad of FIG. 1 with contents of the heat cell being sandwiched between porous membrane structure and substrates;

FIG. 4 shows a partial front sectional view of a heat cell of the heat pad of FIG. 3 with the contents being mixed with capsule shell-encapsulated phase change material (PCM);

FIG. 5 shows partial plan view of a thermochromatic indicator in one colour (unshaded) and being disposable or formable on the substrate of FIG. 3;

FIG. 6 shows partial plan view of the thermochromatic indicator of FIG. 5 in another colour (shaded);

FIG. 7 shows a partial sectional view of the PCM of FIG. 4 with heat being absorbed thereby to transition from a first phase to a second phase;

- 5 FIG. 8 shows a partial sectional view of the PCM of FIG. 7 with heat being released thereby when transitioning from the second phase to the first phase;

FIG. 9 shows the heat pad of FIG. 1 with four heat cells and a perforated line being manipulated for tearing therealong by a user;

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FIG. 10 shows a partial plan view of the heat pad of FIG. 9 being adhered to a target body area of the user with the perforated line being untorn; and

- FIG. 11 shows a partial plan view of the heat pad of FIG. 9 being adhered to the target body
15 area of the user with the perforated line being torn to segregate the heat pad into two portions to fit a wider body size.

Detailed Description

An exemplary embodiment of the present invention, a heat pad 20 and a heat delivery method 100 for delivering heat to a target body area 22 of a person is described hereinafter with reference to FIG. 1 to FIG. 11.

In utilizing the heat delivery method 100, the heat pad 20 comprising at least one heat cell 26 and defining a surface 28 is provided in a step 110. Next, the at least one heat cell 26 is activated for generating heat therefrom to elevate the temperature of the heat pad 20 to substantially within an effective temperature range in a step 112. The at least one heat cell 26 is activated by exposing the heat pad 20, specifically the at least one heat cell 26, to air. As such, the heat pad 20 is preferably provided in an air-tight package or the like containment article whereby breaking or opening the package exposes the heat pad 20 contained therein to be exposed to air, thereby activating the at least one heat cell 26. Additionally or alternatively, one or more non-air permeable strips may be removably adhered or coupled to the heat pad 20 to impede flow of air therethrough. In such an implementation, the strips may be removed to activate the at least one heat cells 26.

The surface 28 of the heat pad 20 is then positioned over the target body area 22 of the person whereto the heat is to be delivered for a first duration in a step 114, subsequent to, prior to or in tandem with the step 112 of activating the at least one heat cell 26. The surface 28 of the heat pad 20 is then intermittently displaced away from the target body area 22 after for a second duration before repositioning the surface 28 of the heat pad 20 substantially back over the target body area 22 in a step 116. The intermittent displacement of the heat pad 20 away from the target body area 22 impedes prolong exposure of skin around the target body area to heat within the effective temperature range. The effective temperature range defining temperature levels that cause low temperature thermal burns with prolonged exposure thereto. Hence, the effective temperature range is preferably within and includes 42 °C and 48 °C. An example of the target body area is the skin of the trapezius muscle of the body of the person.

Preferably, the step 116 of positioning of the heat pad 20 over the target body area 22 is terminated when the first duration elapses in a step 118 where the heat pad is removed from the target body area 22 and may be discarded. Preferably, the first duration is a pre-defined duration for the target body area 22 of the person, while the second duration is substantially
5 between 4 to 6 minutes.

The at least one heat cell 26 contains content 27a comprising at least one of iron, activated carbon, water, salt and vermiculite proportioned for generating heat to within the effective temperature range for the first duration when activated. In order for heat delivery from the
10 at least one heat cell 26 to be regulated, the heat pad 20 comprises at least one porous membrane structure 30 adapted with the at least one heat cell 26 for regulating air flow to and through the at least one heat cell 26. Preferably, the heat pad 20 further comprising adhesive or adhesion segments 32 for removable coupling of the heat pad to garments and/or the target body area 22. Preferably, the content 27a is sandwiched between layers of
15 the at least one porous membrane structure 30.

The application of high heat, for example 42 °C and 48 °C, to the skin or target body area 22 is to increase efficacy of pain relief and to enable shorter duration heat dosage to prevent injury and to allow for re-stimulation of heat receptors, thereby preventing desensitization to
20 the heat pad 20 and to provide improved pain relief. An exemplary application of the heat pad 20 is as single use heating pads containing chemical ingredients such as iron, activated carbon, water, salt and vermiculite which are formulated and calibrated to effect a heat delivery range of 42 °C and 48 °C to the skin, with users instructed to remove the heating pads from the pain area, the target body area 22 after, for example, 10mins if the
25 temperature of the heat pad 20 is at 48°C or 2 hours if the temperature of the heat pad 20 is at 44 °C as prescribed, and to re-adhere or re-position the heating pad for abutment or in proximity with the skin after 5 mins when the skin has cooled back to normal temperature. Other exemplary use of the heating pad is to adhere the heating pad to the clothes which contacts the skin, thereby allowing the intermittent dosage action to be still applicable. The
30 intermittent removal of heat from the pain area functions to prevent injury, it also allows the

heat receptors to reset and be re-stimulated when the pad is placed back on, hence providing a greater sense of relief.

5 Studies have also shown that the stimulation of capsaicin receptors, TRPV1, is a common solution for pain management and pain relief. The stimulation of TRPV1 has been utilised via chemical capsaicin used in analgesic creams or patches. However, it is also worth noting that TRPV1 can also be stimulated when temperature is more than or equals to 43 °C when harnessing the heat delivery method 100 together with the heat pad 20, noting that any temperature below this will result in the receptors not be stimulated and hence will not be
10 able to provide sufficient analgesic effect.

The heat pad 20 further comprises a thermochromatic indicator 40 positioned for providing visual indication of temperature based on at least one of presence, absence, position and type of colour. The thermochromatic indicator 40 comprises at least one thermochromatic
15 pigment composition for changing from one colour when within a first temperature range to another colour when within a second temperature range.

Preferably, the at least one thermochromatic pigment composition being formulated to enable reversible colour change between one colour and another colour. For the avoidance
20 of doubt, the one colour of the at least one thermochromatic pigment composition being colourless. Preferably, the heat pad 20 further comprises a substrate 42 whereon the at least one heat cell is formed with the thermochromatic indicator 40 being a portion of the substrate 42 being one of dyed with the at least one thermochromatic pigment composition and being woven with a carrier containing the at least one thermochromatic pigment
25 composition. The substrate 42 sandwiches the plurality of heat cells 26 with the at least one porous membrane structure 30 interposing the content 27a and the substrate 42.

The thermochromatic indicator 40, specifically the at least one thermochromatic pigment composition, comprises a first thermochromatic pigment composition formulated for
30 changing from a first colour to a second colour at a first temperature level, and a second

thermochromatic pigment composition formulated for changing from a third colour to a fourth colour at a second temperature. It is preferred that the second temperature being higher than the first temperature.

5 In one implementation of the thermochromatic indicator 40, the first colour is the same as the third colour. This will enable both the first thermochromatic composition and the second thermochromatic composition to be formed as a single contiguous structure to provide progressive colour change indicator. In another implementation, the second colour is the same as the fourth colour. This enables both the first thermochromatic pigment composition to be spatially segregated from the second thermochromatic pigment composition within the thermochromatic indicator. When implemented and presented alongside corresponding indicias, the first thermochromatic composition and the second thermochromatic composition can provide an ON/OFF or checkbox-type indicator next to the indicias.

15 In a further implementation of the thermochromatic indicator 40, the thermochromatic indicator 40 can be at least one of shaped, positioned and partially visually occluded for visually presenting at least one of a word, a letter and a symbol.

20 The usage of thermochromic dye, containing thermochromatic pigments, to coat heating products, for example the heat pad 20, to provide visual indication of heating range and to thereby allow users to follow time dosage instructions for prevention of injury. In implementation of the thermochromatic indicator 40, the thermochromic dyes can be coated onto the entire product or partially as a strip, shape or as visual graphics. The thermochromatic dye changes colour at different temperatures, and this indicates different heating levels such as in following example. In an exemplary first phase, the thermochromic dye used in the thermochromatic indicator 40 of the heat pad 20 is dark purple at room temperature, when the heat pad 20 is enclosed or just opened for use. This indicates that the heat pad 20 is at a temperature that is safe to be continuously applied. In an exemplary second phase, the thermochromic dye turns from dark purple to light red at 44

°C. Product temperature is safe to be continuously applied in doses of 120 minutes, and the user should allow his/her skin to cool back to room temperature in between doses.

5 Colour change can also occur across 3 phases instead of 2 phases. This means that two 2 thermochromic dyes having different activation temperatures may be used. This would mean a more granular indication to users of the product's current heat level and dosage instructions. Another approach to thermochromatic indication using the thermochromatic indicator 40 can be to present the "appearance" of a pattern, text, icon or graphic printed underneath thermochromic dye so that when a target higher temperature is reached, the 10 thermochromic dye turns colorless and the pattern, text, icon or graphic underneath is then "unveiled". This could be also a multi-phase indication where more than one thermochromic dye is used so different indications are "unveiled" at different target temperatures.

The heat pad 20 further comprises phase change material 50 (PCM 50) adapted with at least 15 one of a plurality of the heat cells 26 for transitioning from a first phase to a second phase when temperature of the plurality of heat cells 26 exceeds the first temperature level for storing thermal energy generated therefrom. Additionally, the PCM 50 transitions from the second phase to the first phase when temperature of the plurality of heat cells 26 goes below a second temperature level for releasing thermal energy stored thereby. Preferably, the 20 plurality of heat cells 26 are configured with the PCM 50 to enable and improvement of thermal communication therebetween.

Preferably, the PCM 50 is substantially a solid when in the first phase and substantially being a liquid when in the second phase. For the avoidance of doubt and depending on the 25 material used for the PCM 50, both the first and second phases of the PCM 50 may be solid or the first phase and second phase of the PCM 50 may be respectively solid and gas. An example of the PCM 50 is paraffin or caprylone.

It is preferred that the first temperature level is substantially equal to the second temperature level and that at least one of the first temperature level and the second temperature level being between 42 °C and 48 °C.

- 5 There are various approaches for adapting the PCM 50 with the plurality of heat cells 26. The PCM 50 is disposed in at least one of the plurality of heat cells 26. This can be done of both the PCM 50 and the content 27a of the plurality of heat cells 26 are granulated or in a powder form, enabling mixing of the content 27a of the plurality of heat cells 26 with the PCM 50. Alternatively or additionally, the heat pad 20 further comprises a regulator cell
10 containing the PCM 50 and being disposed one of within and adjacent at least one of the plurality of heat cells 26.

The utilization or incorporation of PCM 50, microencapsulated or otherwise in a capsule shell 52, in the chemical air-activated heat pack 20 is to maintain or limit maximum
15 temperature in the air-activated heating product, the heat pack 20, to a pre-specified temperature.

Temperature in the heat pack 20 can be limited at a specified maximum because the PCM 50, for example paraffin or caprylone, is able to absorb excess heat energy once the
20 specified maximum is reached, thus preventing overall temperature of the heat pack 20 from rising above the specified maximum.

The PCM 50 can be incorporated in various forms, for example woven into the materials which bags the chemical mix, mixed directly into the chemical mix, or incorporated into the
25 adhesive portion which is in direct contact with the skin. The function of the PCM 50 is to absorb excess heat produced by the chemicals to maintain a said temperature or temperature range. When the surrounding temperature falls, the PCM 50 functions to release heat to the environment so as to regulate the temperature and this has an added benefit of allowing the heat pack 20 to maintain a more stable temperature over a longer period of time.

The heat pad 20 further comprises a perforated line 60 defined thereby for facilitating tearing of the heat pad along the perforated line for spatially segregating two portions of the heat pad to thereby enable the heat pad to be at least one of shaped and configured for substantially adapting to shape and dimension of the target body area of the person for directing heat generated by the plurality of heat cells thereto, each of the two portions of the heat pad comprising at least one of the plurality of heat cells.

Preferably, the perforated line 60 extends from one point to terminate at another point on the periphery of the heat pad 20. This enables the heat pad to be segregated into the two portions that are structurally independent and physically disconnected. This enables application of the heat pad 20 to a plurality of non-contiguous segments of the target body area 22 of the person.

In a preferred application, the perforated line 60 is defined and shaped for segregating the heat pad 20 into two symmetrical segments when torn. However, the perforated line 60 can also have at least one of straight and curved segments.

Alternatively, the perforated line 60 extends from within and terminates at the periphery of the heat pad 20. This enables the heat pad 20 to be segregated into the two portions while still remaining coupled to one another.

The heat pad 20 can further comprise a plurality of the perforated line 60. The plurality of perforated lines may be defined along the heat pad without intersecting each other. Alternatively, the defined perforated lines intersect one another to further application of the heat pad 20 to the plurality of non-contiguous segments of the target body area 22 of the person

The perforated line 60 enables a splitting or dividing the heat pad 20 product into more 2 or more parts for flexible usage on different body areas and to provide more targeted relief for varying body sizes. This is achieved by ingredient segmentation, into the segmented

plurality of heat cells 26, and subsequent perforation in between segments during manufacture thereof. When a user of the heat pad intends to “split” the heat pad 20, the user simply needs to exert a reasonable amount of force to tear along the perforated line 60 to impart extreme flexibility in allowing a single one of the heat pad 20 to fit multiple body sizes & shapes easily and/or ergonomically. The perforation pitch and size are calibrated to withstand mechanical stresses due to movement / transport of heat pad 20 so that the perforated line 60 remains intact when users prefer to use it as a single continuous piece.

The foregoing describes an aspect of the invention, a method for delivering heat to a target body area of a person, comprising providing a heat pad comprising at least one heat cell and a surface, activating the at least one heat cell for generating heat therefrom to elevate the temperature of the heat pad to substantially within an effective temperature range; positioning the surface of the heat pad over the target body area of the person where to the heat is to be delivered for a first duration, and intermittently displacing the surface of the heat pad away from the target body area after for a second duration before repositioning the surface of the heat pad substantially over the target body area. Wherein the intermittent displacement of the heat pad away from the target body area impedes prolong exposure of skin around the target body area to heat within the effective temperature range.

The foregoing also describes another aspect of the invention, a heat pad for delivering heat to a target body area of person, comprising at least one heat cell and a surface, the at least one heat cell being activatable for generating heat therefrom to elevate the temperature of the heat pad to substantially within an effective temperature range, the surface being shaped and dimensioned for positioning over the target body area of the person where to the heat is to be delivered for a first duration. Wherein intermittently displacing the surface of the heat pad away from the target body area after for a second duration before repositioning the surface of the heat pad substantially over the target body area impedes prolong exposure of skin around the target body area to heat within the effective temperature range.

The effective temperature range defines temperature levels that cause low temperature thermal burns with prolonged exposure thereto, with the effective temperature range being within and includes 42 °C and 48 °C, the first duration being a pre-defined duration for the target body area of the person, and the second duration being substantially between 4 to 6 minutes. The at least one heat cell is activated for generating heat when exposed to air. The at least one heat cell comprising at least one of iron, activated carbon, water, salt and vermiculite, proportioned for generating heat to within the effective temperature range for the first duration when activated. The heat pad further comprises at least one porous membrane structure adapted with the at least one heat cell for regulating air flow to the at least one heat cell and adhesive for removable coupling of the heat pad to garments.

The heat pad also comprises a thermochromatic indicator positioned for providing visual indication of temperature based on at least one of presence, absence, position and type of colour. The thermochromatic indicator comprises at least one thermochromatic pigment composition for changing from one colour when within a first temperature range to another colour when within a second temperature range. The at least one thermochromatic pigment composition being formulated to enable reversible colour change between one colour and another colour, with the one colour of the at least one thermochromatic pigment composition being colourless.

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The heat pad further comprises a substrate whereon the at least one heat cell is formed with the thermochromatic indicator being a portion of the substrate being one of dyed with the at least one thermochromatic pigment and being woven with a carrier containing the at least one thermochromatic pigment. The thermochromatic indicator comprises a first thermochromatic pigment composition formulated for changing from a first colour to a second colour at a first temperature level, and a second thermochromatic pigment composition formulated for changing from a third colour to a fourth colour at a second temperature.

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The second temperature is higher than the first temperature. The first colour being the same as the third colour or the second colour being the same as the fourth colour. The first thermochromatic pigment composition being spatially segregated from the second thermochromatic pigment composition within the thermochromatic indicator with the thermochromatic indicator being at least one of shaped, positioned and partially visually occluded for visually presenting at least one of a word, a letter and a symbol.

The heat pad further comprises phase change material (PCM) adapted with at least one of the plurality of heat cells for transitioning from a first phase to a second phase when temperature of the plurality of heat cells exceeds the first temperature level for storing thermal energy generated therefrom. The PCM transitions from the second phase to the first phase when temperature of the plurality of heat cells goes below a second temperature level for releasing thermal energy stored thereby.

The PCM is substantially a solid when in the first phase and substantially being a liquid when in the second phase, wherein the first temperature level is substantially equal to the second temperature level. At least one of the first temperature level and the second temperature level being between 42 °C and 48 °C. The PCM can comprise paraffin or caprylone.

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The heat pad as in claim 1, the PCM being disposed in at least one of the plurality of heat cells with the heat pad further comprising a regulator cell containing the PCM and being disposed one of within and adjacent at least one of the plurality of heat cells.

The Heat pad further comprises a perforated line defined by the heat pad for facilitating tearing of the heat pad along the perforated line for spatially segregating two portions of the heat pad to thereby enable the heat pad to be at least one of shaped and configured for substantially adapting to shape and dimension of the target body area of the person for directing heat generated by the plurality of heat cells thereto, each of the two portions of the heat pad comprising at least one of the plurality of heat cells. The perforated line can extend

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from within and terminates at the periphery of the heat pad or can extend from one point to terminate at another point on the periphery. The perforated line can be defined and shaped for segregating the heat pad into two symmetrical segments when torn, and can have at least one of straight and curved segments. The target body area of the person comprising a plurality of non-contiguous segments of the target body area.

A heat pad can alternatively or additionally comprise a plurality of perforated lines defined by the heat pad for facilitating tearing of the heat pad along the plurality of perforated line for spatially segregating a plurality of portions of the heat pad to thereby enable the heat pad to be at least one of shaped and configured for substantially adapting to shape and dimension of the target body area of the person for directing heat generated by the plurality of heat cells thereto, each of the plurality of portions of the heat pad comprising at least one of the plurality of heat cells. At least two of the plurality of perforated lines may intersect one another.

Aspects of particular embodiments of the present disclosure address at least one aspect, problem, limitation, and/or disadvantage associated with existing heat pads and heat delivery methods. While features, aspects, and/or advantages associated with certain embodiments have been described in the disclosure, other embodiments may also exhibit such features, aspects, and/or advantages, and not all embodiments need necessarily exhibit such features, aspects, and/or advantages to fall within the scope of the disclosure. It will be appreciated by a visitor of ordinary skill in the art that several of the above-disclosed structures, components, or alternatives thereof, can be desirably combined into alternative structures, components, and/or applications. In addition, various modifications, alterations, and/or improvements may be made to various embodiments that are disclosed by a visitor of ordinary skill in the art within the scope of the present disclosure, which is limited only by the following claims.

Claims

1. A method for delivering heat to a target body area of a person comprising:
 - providing a heat pad comprising at least one heat cell and a surface;
 - 5 activating the at least one heat cell for generating heat therefrom to elevate the temperature of the heat pad to substantially within an effective temperature range;
 - positioning the surface of the heat pad over the target body area of the person where to the heat is to be delivered for a first duration; and
 - intermittently displacing the surface of the heat pad away from the target body
 - 10 area after for a second duration before repositioning the surface of the heat pad substantially over the target body area,
 - wherein the intermittent displacement of the heat pad away from the target body area impedes prolong exposure of skin around the target body area to heat within the effective temperature range.
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2. The method as in claim 1, the effective temperature range defining temperature levels that cause low temperature thermal burns with prolonged exposure thereto.
3. The method s in claim 1, the effective temperature range being within and includes 42
- 20 °C and 48 °C.
4. The method as in claim 1, the first duration being a pre-defined duration for the target body area of the person.
- 25 5. The method as in claim 1, the second duration being substantially between 4 to 6 minutes.
6. The method as in claim 1, wherein the at least one heat cell is activated for generating heat when exposed to air
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7. The method as in claim 1, the at least one heat cell comprising at least one of iron, activated carbon, water, salt and vermiculite proportioned for generating heat to within the effective temperature range for the first duration when activated.
- 5 8. The method as in claim 1, wherein the heat pad comprises at least one porous membrane structure adapted with the at least one heat cell for regulating air flow to the at least one heat cell.
9. The method as in claim 1, the heat pad further comprising adhesive for removable
10 coupling of the heat pad to garments.
10. A heat pad for delivering heat to a target body area of person comprising:
at least one heat cell and a surface, the at least one heat cell being activatable for
generating heat therefrom to elevate the temperature of the heat pad to substantially
15 within an effective temperature range, the surface being shaped and dimensioned for
positioning over the target body area of the person whereto the heat is to be delivered
for a first duration,
wherein intermittently displacing the surface of the heat pad away from the
target body area after for a second duration before repositioning the surface of the heat
20 pad substantially over the target body area impedes prolong exposure of skin around
the target body area to heat within the effective temperature range.
11. The heat pad as in claim 10, the effective temperature range defining temperature
levels that cause low temperature thermal burns with prolonged exposure thereto.
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12. The heat pad as in claim 10, the effective temperature range being within and includes
42 °C and 48 °C.
13. The heat pad as in claim 10, the first duration being a pre-defined duration for the
30 target body area of the person.

14. The heat pad as in claim 10, the second duration being substantially between 4 to 6 minutes.

5 15. The heat pad as in claim 10, wherein the at least one heat cell is activated for generating heat when exposed to air

16. The heat pad as in claim 10, the at least one heat cell comprising at least one of iron, activated carbon, water, salt and vermiculite, proportioned for generating heat to
10 within the effective temperature range for the first duration when activated.

17. The heat pad as in claim 10, further comprising at least one porous membrane structure adapted with the at least one heat cell for regulating air flow to the at least one heat cell.

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18. The heat pad as in claim 10, the heat pad further comprising adhesive for removable coupling of the heat pad to garments.