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Datasheet for the decision of 8 August 2017

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IMPROVED IN VIVO BLOOD SPECTROMETRY

Applicant:
BERNREUTER, Peter

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Catchword:

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Case Number: T 1997/14 - 3.2.02

D E C I S I O N
of Technical Board of Appeal 3.2.02
of 8 August 2017

Appellant: (Applicant)	BERNREUTER, Peter Hintere Str. 60 73265 Dettingen U. Teck (DE)
Representative:	Jacobacci Coralis Harle 32, rue de l'Arcade 75008 Paris (FR)
Decision under appeal:	**Decision of the Examining Division of the European Patent Office posted on 27 March 2014 refusing European patent application No. 06795079.0 pursuant to Article 97(2) EPC.**

Composition of the Board:

Chairman	E. Dufrasne
Members:	M. Stern
	D. Ceccarelli

Summary of Facts and Submissions

I. The applicant lodged an appeal against the decision of the Examining Division, dispatched on 27 March 2014, refusing European patent application No. 06 795 079.0 on the grounds that the different independent claims then on file contravened Articles 123(2) and/or 84 EPC.

II. Notice of appeal was filed on 23 May 2014 and the fee for appeal was paid the same day. A statement setting out the grounds of appeal was received on 31 July 2014.

III. The appellant requested that the decision under appeal be set aside and that a patent be granted on the basis of one of the main request and auxiliary requests 1, 3, 4, 5, 6 and 2 all filed with letter dated 24 August 2016, in that order.

IV. The appellant was summoned on 28 March 2017 to attend oral proceedings. In a communication annexed to the summons the Board presented its provisional opinion raising objections regarding lack of clarity and added subject-matter (Articles 84 and 123(2) EPC).

V. In a letter dated 4 August 2017, the appellant announced that it would not be attending the oral proceedings. The objections raised in the Board's communication were not addressed.

VI. Oral proceedings took place on 8 August 2017 in the absence of the appellant (in accordance with Rule 115(2) EPC and Article 15(3) RPBA).

VII. Claim 1 of the **main request** reads as follows:

"1. Apparatus for measuring venous oxygenation in tissue comprising:

(a) a sensor interface adapted to be coupled to a tissue site and including at least two light emitters placed apart from each other on said interface with at least three different wavelengths w1, w2, w3 which emit light into tissue and at least two detectors for detecting light;

(b) means for calculating at least two signals LAwj which depend on detected light for selected wavelength wj for said two detectors and said two emitters, wherein the at least two signals are calculated by adding or subtracting light attenuations for at least two possible light paths between said at least two light emitters and said at least two detectors; and

(c) means for generating an output representative of venous oxygenation based on the at least said two signals;

wherein said means for calculating at least two resulting light attenuations LAwj is adapted to perform for at least two of the at least three different wavelengths wj calculation steps of:

calculating light attenuation LA (Al, wj) of light emitted in a first emitter and received at a first detector;

calculating light attenuation LA(A4,wj) of light emitted in a second emitter and received at a second detector;

calculating light attenuation LA(A2,wj) of light emitted in said first emitter and received at said second detector;

calculating light attenuation LA (A3, wj) of light emitted in said second emitter and received at said first detector;

calculating the at least two signals LAwj at said wavelength wj by adding the light attenuations of LA(A2,wj) and LA(A3, wj) and subtracting therefrom light attenuations LA(A1,wj) and LA(A4,wj)."

VIII. Claim 1 of **auxiliary request 1** reads as follows:

"1. Apparatus for measuring venous oxygenation in tissue comprising:

(a) a sensor interface adapted to be coupled to a tissue site and including at least two light emitters placed apart from each other on said interface with at least three different wavelengths w1, w2, w3 which emit light into tissue and at least two detectors for detecting light, wherein said wavelength w2 corresponds to the geometrical mean value of said wavelength w1 and said wavelength w3 +/- 80 nm;

(b) means for calculating at least two signals LAwj which depend on detected light for selected wavelength wj for said two detectors and said two emitters, wherein the at least two signals are calculated by adding or subtracting light attenuations for at least two possible light paths between said at least two light emitters and said at least two detectors; and

(c) means for generating an output representative of venous oxygenation based on the at least said two signals;

wherein said means for calculating at least two resulting light attenuations LAwj is adapted to perform for at least two of the at least three different wavelengths wj calculation steps of:

calculating light attenuation LA (Al, wj) of light emitted in a first emitter and received at a first detector;

calculating light attenuation LA(A4,wj) of light emitted in a second emitter and received at a second detector;

calculating light attenuation LA(A2,wj) of light emitted in said first emitter and received at said second detector;

calculating light attenuation LA (A3, wj) of light emitted in said second emitter and received at said first detector;

calculating the at least two signals LAwj at said wavelength wj by adding the light attenuations of LA(A2,wj) and LA(A3, wj) and subtracting therefrom light attenuations LA(A1,wj) and LA(A4,wj)."

IX. Claim 1 of **auxiliary request 2** reads as follows:

"1. Apparatus for measuring venous oxygenation in tissue comprising:

(a) a sensor interface adapted to be coupled to a tissue site and including at least two light emitters placed apart from each other on said interface with at least three different wavelengths w1, w2, w3 which emit light into tissue and at least two detectors for detecting light;

(b) means for calculating at least two signals LAwj which depend on detected light for selected wavelength wj for said two detectors and said two emitters, wherein the at least two signals are calculated by adding or subtracting light attenuations for at least two possible light paths between said at least two light emitters and said at least two detectors; and

(c) means for generating an output representative of venous oxygenation based on the at least said two signals;

wherein said means for calculating at least two resulting light attenuations LAwj is adapted to perform for at least two of the at least three different wavelengths wj calculation steps of:

calculating light attenuation LA (Al, wj) of light emitted in a first emitter and received at a first detector;

calculating light attenuation LA(A4,wj) of light emitted in a second emitter and received at a second detector;

calculating light attenuation LA(A2,wj) of light emitted in said first emitter and received at said second detector;

calculating light attenuation LA (A3, wj) of light emitted in said second emitter and received at said first detector;

calculating the at least two signals LAwj at said wavelength wj by adding the light attenuations of LA(A2,wj) and LA(A3, wj) and subtracting therefrom light attenuations LA(A1,wj) and LA(A4,wj),

wherein the means for generating an output representative of venous oxygenation is adapted to calculate one of the following measurement variables for venous oxygenation:

Rv' = (LAw3*LAw1)/(Law2*LAw2),

Rvb = LAw2/LAw3 or

Rvs = (LAw1 - LAw2)/(LAw2 - LAw3)."

X. Claim 1 of **auxiliary requests 3 and 4** reads as follows:

"1. Apparatus for measuring venous oxygenation in tissue comprising:

(a) a sensor interface adapted to be coupled to a tissue site and including at least two light emitters placed apart from each other on said interface with three different wavelengths w0, w1,

w2 which emit light into tissue and at least two detectors for detecting light, wherein the wavelengths are w0 = 940 nm, w1 = 805 nm and w2 = 660 nm;

(b) means for calculating three signals LAwj which depend on detected light for selected wavelength wj for said two detectors and said two emitters, wherein the at least two signals are calculated by adding or subtracting light attenuations for at least two possible light paths between said at least two light emitters and said at least two detectors; and

(c) means for generating an output representative of venous oxygenation based on the at least said two signals;

wherein said means for calculating at least two resulting light attenuations LAwj is adapted to perform for at least two of the at least three different wavelengths wj calculation steps of:

calculating light attenuation LA (Al, wj) of light emitted in a first emitter and received at a first detector;

calculating light attenuation LA(A4,wj) of light emitted in a second emitter and received at a second detector;

calculating light attenuation LA(A2,wj) of light emitted in said first emitter and received at said second detector;

calculating light attenuation LA (A3, wj) of light emitted in said second emitter and received at said first detector;

calculating the three signals LAwj at said wavelengths wj by adding the light attenuations of LA(A2,wj) and LA(A3, wj) and subtracting therefrom light attenuations LA(A1,wj) and LA(A4,wj),

wherein the means for generating an output representative of venous oxygenation is adapted to calculate the following measurement variable Rv' as a signal for mixed venous oxygenation:

Rv' = (LAw2*LAw0)/(LAw1*LAw1)."

XI. Claim 1 of **auxiliary request 5** reads as follows:

"1. Apparatus for measuring venous oxygenation in brain comprising:

(a) a sensor interface adapted to be coupled to a tissue site and including at least two light emitters placed apart from each other on said interface with three different wavelengths wb1, wb2, wb3 which emit light into tissue and at least two detectors for detecting light, wherein the wavelengths are wb1 = 660 nm, wb2 = 740 nm and wb3 = 810 nm;

(b) means for calculating three signals LAwbj which depend on detected light for selected wavelength wbj for said two detectors and said two emitters, wherein the at least two signals are calculated by adding or subtracting light attenuations for at least two possible light paths between said at least two light emitters and said at least two detectors; and

(c) means for generating an output representative of venous oxygenation based on the at least said two signals;

wherein said means for calculating at least two resulting light attenuations LAwbj is adapted to perform for at least two of the at least three different wavelengths wsj calculation steps of:

calculating light attenuation LA (Al, wbj) of light emitted in a first emitter and received at a first detector;

calculating light attenuation LA(A4,wbj) of light emitted in a second emitter and received at a second detector;

calculating light attenuation LA(A2,wbj) of light emitted in said first emitter and received at said second detector;

calculating light attenuation LA (A3, wbj) of light emitted in said second emitter and received at said first detector;

calculating the three signals LAwbj at said wavelengths wbj by adding the light attenuations of LA(A2,wbj) and LA(A3, wbj) and subtracting therefrom light attenuations LA(A1,wbj) and LA(A4,wbj),

wherein the means for generating an output representative of venous oxygenation is adapted to calculate the ratio Rvb of the resulting light attenuations LAwb2 and LAwb3 as a measure for mixed venous oxygenation."

XII. Claim 1 of **auxiliary request 6** reads as follows:

"1. Apparatus for measuring venous oxygenation in tissue comprising:

(a) a sensor interface adapted to be coupled to a tissue site and including at least two light emitters placed apart from each other on said interface with three different wavelengths ws1, ws2, ws3 which emit light into tissue and at least two detectors for detecting light, wherein the wavelengths are ws1 = 700 nm, ws2 = 805 nm and ws3 = 870 nm;

(b) means for calculating three signals LAwsj which depend on detected light for selected wavelength wsj for said two detectors and said two emitters, wherein the at least two signals are calculated by adding or subtracting light attenuations for at

least two possible light paths between said at least two light emitters and said at least two detectors; and

(c) means for generating an output representative of venous oxygenation based on the at least said two signals;

wherein said means for calculating at least two resulting light attenuations LAwsj is adapted to perform for at least two of the at least three different wavelengths wsj calculation steps of:

calculating light attenuation LA (Al, wsj) of light emitted in a first emitter and received at a first detector;

calculating light attenuation LA(A4,wsj) of light emitted in a second emitter and received at a second detector;

calculating light attenuation LA(A2,wsj) of light emitted in said first emitter and received at said second detector;

calculating light attenuation LA (A3, wsj) of light emitted in said second emitter and received at said first detector;

calculating the three LAwsj at said wavelengths wsj by adding the light attenuations of LA(A2,wsj) and LA(A3, wsj) and subtracting therefrom light attenuations LA(A1,wsj) and LA(A4,wsj),

wherein the means for generating an output representative of venous oxygenation is adapted to calculate the measurement variables Rvs for mixed venous oxygenation:

Rvs = (LAws1 - LAws2)/(LAws2 - LAws3)."

XIII. The arguments presented by the appellant which are relevant for the present decision are summarised as follows:

Claim 1 of the main request was clear and did not extend beyond the content of the application as filed. It had been amended to define how the resulting light attenuations LAwj were calculated. The calculation found support on page 12, lines 23 to 33 (example 1), where equations (5) to (7) explained how it was performed.

Reasons for the Decision

1. The appeal is admissible.

2. Main request

2.1 Claim 1 is directed to an apparatus for measuring venous oxygenation in tissue, comprising in essence:
- a sensor interface including (at least) two light emitters with at least three different wavelengths and (at least) two light detectors,
- means for calculating signals which depend on the detected light and
- means for generating an output representative of venous oxygenation based on said signals.

However, the definition of the apparatus contains several terminological inconsistencies which make it impossible to unambiguously establish the subject-matter for which protection is sought.

Among the inconsistencies are the following:

2.2 In claim 1, the feature "said means for calculating at least two resulting light attenuations LAwj" does not have a clear antecedent. Inconsistently, the feature is preceded by calculation means defined in feature (b) as

"means for calculating at least two signals LAwj which depend on detected light for selected wavelength wj".

2.3 Moreover, the claim does not define the relationship between the "selected wavelength wj" in the latter expression and the "three different wavelengths w1, w2, w3" recited in feature (a). Even assuming that "j" is an index, since its value or values are not defined it is not clear which of the preceding wavelength(s) is or are selected. Given three or more wavelengths wj, there is no single choice for index "j" or the plurality of indices "j". According to feature (c), the output representative of venous oxygenation is generated on the basis of, in particular, two of said signals LAwj.

2.4 Lastly, according to feature (a) of claim 1, the apparatus comprises at least two emitters and at least two detectors. It is hence unclear whether or not, in the calculating steps of claim 1, the reference to apparently different emitters and detectors ("a first emitter", "a second emitter", "a first detector" and "a second detector") is to be understood as referring to the corresponding elements of feature (a).

2.5 The appellant chose not to comment or otherwise react to the above objections, which were raised by the Board in its communication annexed to the summons to oral proceedings. In particular, the claims objected to were left unchanged.

2.6 Hence, at least for the reasons mentioned above, the Board finds that claim 1 of the main request is not clear within the meaning of Article 84 EPC.

3. Auxiliary requests 1 to 6

In auxiliary request 1, claim 1 additionally defines w2 in terms of w1 and w3.

In auxiliary requests 2 to 6, claim 1 additionally contains a definition of a measurement variable for venous oxygenation (Rv) in terms of the "signals". Moreover, in claim 1 of auxiliary requests 3 to 6, three (rather than at least three) different wavelengths are defined, and the definition of "at least two signals LAwj at said wavelength wj" of the higher-ranking requests is replaced with the calculation of three signals LAwj at said wavelengths wj (in auxiliary requests 5 and 6, the signals LAwj are termed LAwbj and LAwsj, respectively).

Hence, in spite of these additions and replacements, the aforementioned deficiencies under Article 84 EPC also apply mutatis mutandis to claim 1 of auxiliary requests 1 to 6.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

D. Hampe E. Dufrasne

Decision electronically authenticated