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Datasheet for the decision of 27 March 2014

Case Number: T 0122/09 - 3.4.01

Application Number: 00903097.4

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IPC: G01R33/563

Language of the proceedings: EN

Title of invention:
CONTRAST AGENT ENHANCED MAGNETIC RESONANCE ANGIOGRAPHY WITH VESSEL SEGMENTATION

Applicant:
WISCONSIN ALUMNI RESEARCH FOUNDATION

Headword:

Relevant legal provisions:
EPC 1973 Art. 84

Keyword:
Clarity

Decisions cited:

Catchword:

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Case Number: T 0122/09 - 3.4.01

D E C I S I O N
of Technical Board of Appeal 3.4.01
of 27 March 2014

Appellant: (Applicant)	WISCONSIN ALUMNI RESEARCH FOUNDATION 614 North Walnut Street Madison, WI 53705 (US)
Representative:	Price, Nigel John King J A Kemp 14 South Square Gray's Inn London WC1R 5JJ (GB)
Decision under appeal:	**Decision of the Examining Division of the European Patent Office posted on 29 August 2008 refusing European patent application No. 00903097.4 pursuant to Article 97(2) EPC.**

Composition of the Board:

Chairwoman: F. Neumann
Members: P. Fontenay
J. Geschwind

Summary of Facts and Submissions

I. The present decision relates to the appeal which was filed against the decision of the examining division to refuse European patent application No. 00 903 097.4. The decision was remitted to the post on 29 August 2008.

II. The decision relied on the finding that the requests on file did not meet the requirements of the EPC with regard to clarity (Article 84 EPC 1973), novelty and inventive step (Articles 54, 56 EPC 1973), and added subject-matter (Article 123(2) EPC).

III. The appellant (applicant) lodged an appeal against this decision by notice filed on 3 November 2008, requesting that the decision under appeal be set aside in its entirety. The appeal fee was paid on the same day.

In the written statement setting out the grounds of appeal, received on 30 December 2008, the appellant requested that a patent be granted on the basis of claims 1 to 23 of a main request or, alternatively, on the basis of claims 1 to 22 of first or second auxiliary requests or 1 to 21 of third auxiliary request.

IV. Oral proceedings were requested in the case that the Board considered that the main request was not allowable. A summons to attend oral proceedings was accordingly issued on 15 October 2013.

V. On 18 October 2013, the Board issued a communication pursuant to Article 15(1) RPBA, expressing its provisional opinion with regard to the requests on file.

The attention of the appellant was, firstly, drawn to shortcomings in the wording of the claims with regard to the issue of added subject-matter under Article 123(2) EPC. Secondly, although the Board did not share many of the objections raised by the examining division in its decision with regard to clarity, it nevertheless observed that the claimed subject-matter did not appear to be clearly defined (Article 84 EPC). In the Board's provisional opinion, the feature according to which the brightness of a voxel in an image was to be modified by taking into account the results of two comparisons with two independent parameters was ambiguous. This objection applied to all the requests on file.

Finally, while the Board acknowledged the novelty of the claimed subject-matter according to all requests, insofar as it couls be interpreted in the light of the description, it expressed doubts whether any of the claimed definitions met the requirements of the EPC as to the presence of an inventive step (Article 56 EPC 1973).

VI. No reply to the communication of the Board was filed.

VII. Oral proceedings before the Board took place on 27 March 2014 in the absence of the appellant.

VIII. Claim 1 of the main request reads as follows:

"*1. A method for producing a magnetic resonance angiogram of a patient, who has been injected with a contrast agent which flows into a region of interest in the patient, using an MRI system, the steps comprising:*
a) acquiring NMR image data for the region of interest for a series of NMR time course images

(301-308) during a time resolved phase of an examination, during which the contrast agent makes a first passage through the patient's arteries and veins in the region of interest;

b) reconstructing the series of NMR time course images (301-308);

c) manually selecting voxels in the respective images which lie within at least one artery;

d) producing from the NMR time course images (301-308) one signal-versus-time arterial enhancement reference curve (280) that indicates the signal level enhancement, caused by the contrast agent, of the manually selected voxels depicting arteries during the time resolved phase, by averaging the brightness values of the manually selected voxels depicting arteries in the series of NMR time course images (301-308);

e) acquiring NMR image data for the region of interest during a steady state phase of the examination which follows the time resolved phase, wherein the NMR image data acquired during the time resolved phase is acquired at a higher temporal resolution than the NMR image data acquired during the steady state phase of the examination, and the NMR image data acquired during the steady state phase is of higher spatial resolution than the NMR image data acquired during the time resolved phase of the examination;

f) reconstructing an image of the region of interest from NMR image data acquired during the time resolved phase and NMR image data acquired during the steady-state phase of the examination; and

g) producing the magnetic resonance angiogram by segmenting the image reconstructed in step f) so that arteries and veins can be distinguished from each other and from background tissues, wherein the segmenting includes comparing the brightness levels of each image voxel during the time resolved phase of the examination

with corresponding points in the arterial enhancement reference curve and modifying the brightness of the voxel in the magnetic resonance angiogram as a function of this comparison."

Claims 2 to 23 of the main request are dependent claims.

Claim 3 whose wording is relevent for the present decision reads as follows:
"3. *The method as recited in claim 1 which further includes:*

manually selecting voxels in the respective images which lie within at least one vein; and

producing from the NMR time course images (301-308) one signal-versus-time venous enhancement reference curve (282) that indicates the signal level enhancement, caused by the contrast agent, of the manually selected voxels depicting veins during the time resolved phase of the examination, by averaging the brightness values of the manually selected voxels depicting veins in the series of NMR time course images (301-308); and

the segmenting in step g) further employs the venous enhancement reference curve (282)."

Claim 1 according to the first auxiliary request differs from claim 1 according to the main request in that step c) has been further completed by incorporating the additional step of "*manually selecting voxels in the respective images which lie within at least one vein*", in that step d) has been accordingly amended by additionally referring to the production of "*one signal-versus-time venous enhancement reference curve*" and defining that the manually selected voxels depict "*arteries and veins,*

respectively", and in that step g) has been further amended by specifying: "*wherein the segmenting further employs the venous enhancement reference curve (282)*".

Claim 1 according to the second auxiliary request differs from claim 1 according to the main request in that step f) has been amended by specifying "*wherein all the k-space data segments acquired during the time resolved phase and steady state phase of the examination are combined into a single 3D k-space data set by taking the average value or a weighted average of each k-space sample in corresponding segments of k-space*".

Claim 3 of the second auxiliary request is identical to claim 3 of the main request.

Claim 1 of the third auxiliary request differs from claim 1 of the main request in that it incorporates the amendments carried out in claim 1 of both first and second auxiliary requests.

Reasons for the Decision

1. *Applicable law*

This decision is issued after the entry into force of the EPC 2000 on 13 December 2007 whereas the application was filed before this date. Reference is thus made to the relevant transitional provisions for the amended and new provisions of the EPC, from which it may be derived which Articles and Rules of the EPC 1973 are still applicable to the present application and which Articles and Rules of the EPC 2000 are to apply. When Articles or Rules of the former version of

the EPC are cited, their citations are followed by the indication “1973” (cf. EPC, Citation practice).

2. *Admissibility of the appeal*

*T*he notice of appeal and the corresponding statement of grounds comply with the requirements of Articles 106 to 108 EPC and Rule 99 EPC. The appeal is, thus, admissible.

3. *Clarity (Article 84 EPC 1973)*

In the absence of any reply to the communication of the Board dated 18 October 2013, the Board does not see any reason to revise its provisional position as expounded in that communication. In this respect, it is in particular considered that none of the requests on file meet the requirements of Article 84 EPC 1973 as to clarity.

3.1 The indication in dependent claim 3 of the main request according to which "*the segmenting in step g) further employs the venous enhancement reference curve*" is not clear when read in combination with independent claim 1 on which it depends. The ambiguity results from the definition in step g) of claim 1 according to which the brightness of a voxel in the magnetic resonance angiogram is modified as a function of the comparison of the brightness of each image voxel during the time resolved phase with corresponding points in the **arterial** enhancement reference curve.

It is not clear from the present definition in what manner the venous enhancement reference curve is to be employed in the segmenting in step g). It is therefore not derivable from the present definition how said

brightness of the image obtained in accordance with step f) of claim 1 should be modified when taking into account on the one hand, the first comparison with the arterial enhancement reference curve and, on the other hand, the venous enhancement reference curve.

3.2 This ambiguity is exacerbated by the fact that the angiogram to be produced in step g) of claim 1 of the main request is not only to distinguish arteries and veins from each other but also arteries and veins from background tissues (see page 12, lines 8-11 of the application as published under the PCT). The description on page 13, line 13 to page 14, line 16 provides some guidance as to a possible implementation of the claimed method relying on the determination of correlation factors used for the determination of weighting factors to be applied to each voxel of the image calculated in step f) of claim 1. However, claim 3, is drafted in such a broad manner that it is in no way limited to this embodiment. As a matter of fact, it does not even recite any of the basic principles relied upon in said embodiment and does not even suggest that the venous enhancement curve should be employed in the same manner as the arterial enhancement curve.

In other words, claim 3 of the main request fails to incorporate all the essential features which, in view of the present diclosure, are required to associate one voxel to any of the three categories of objects recited, i.e. arteries, veins and background tissues. As a result claim 3 of the main request is not clear.

3.3 This objection also applies, *mutatis mutandis*, to the combination of independent claim 1 and dependent claim 3 of the second auxiliary request. Similarly, it also

applies to claim 1 of each of the first and third auxiliary requests. Each of these claims specify that the segmenting step "*further employs the venous enhancement curve*" without indicating how this additional information is to be taken into account.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairwoman:

R. Schumacher F. Neumann

Decision electronically authenticated