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GI:110347545.《GenBank》.2013,氨基酸序列.
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孙佳等.急性低氧对小鼠黏附分子CHL1组织水平表达的影响.《中国应用生理学杂志》.2011,第27卷(第3期),第280-283页.

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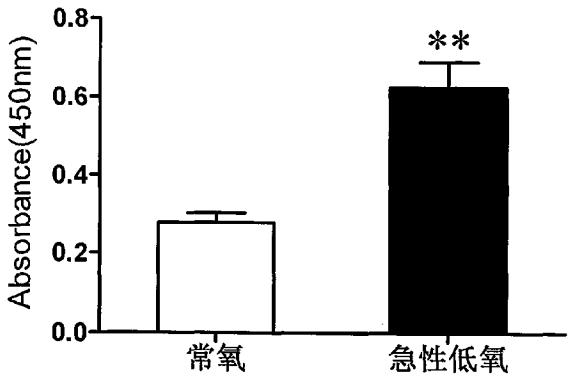
(54)发明名称

低氧标志分子CHL1及其应用

(57)摘要

本发明公开了属于生物医学材料技术领域的一种低氧标志分子CHL1及其应用。该标志分子为细胞粘附分子CHL1,其蛋白序列如SEQ ID No.1或SEQ ID No.2所示。本发明的CHL1可作为一种低氧标志分子,应用免疫学方法,利用该标志物分子制备的抗体和酶标二抗,利用酶联免疫学检测方法,可检测动物及人是否处于低氧状态,检测灵敏可靠。



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1.一种低氧标志分子的抗体在制备人低氧检测试剂盒中的应用，其特征在于，该标志分子为CHL1，其蛋白序列如SEQ ID No.2所示。

低氧标志分子 CHL1 及其应用

技术领域

[0001] 本发明属于生物医学材料技术领域，具体涉及一种低氧标志分子 CHL1 及其应用。

背景技术

[0002] 环境低氧损伤一直以来是高原医学、航天医学、运动医学等学科领域面临的共性问题，也是特殊环境生理学研究的重要领域[1,2]。低氧可引起神经、呼吸和循环主要系统功能障碍，严重时可导致呼吸衰竭，危及生命[3]。低氧也是许多疾病如心肌梗死、脑梗死、动脉粥样硬化等心脑血管疾病共有的病理生理过程，此外，低氧也是实体瘤微环境的重要特征之一，是临床上实体瘤对放疗、化疗产生耐受和预后效果差的重要原因[4]。因此，低氧是危害人体健康的重要病理生理因素。

[0003] 细胞粘附分子(cell adhesion molecules，CAMs)是体内细胞生存的微环境，可促进细胞与细胞之间，细胞与细胞外基质之间粘附和识别，在维持细胞结构完整和细胞信号转导中起重要作用，是细胞生长和神经系统发育过程的重要调控因子。CAMs 主要分为四类：整合素家族、免疫球蛋白超家族、选择素家族和钙粘蛋白家族[5]。CHL1(close homologue of L1，CHL1)，又称 CALL、L1CAM2，是 1996 年 Holm 等在小鼠基因组中克隆得到，与神经粘附分子 L1 高度同源的基因，属于粘附分子免疫球蛋白超家族的成员。CHL1 作为一种跨膜蛋白，包含 N 端信号序列、6 个免疫球蛋白 (Ig) 样结构域、5 个纤粘连蛋白 III(FnIII) 重复序列、一个跨膜结构域和含有骨架蛋白锚蛋白 (anykrin) 识别序列 (FIGAY) 的保守胞内区。与 L1 不同的是，在中枢神经系统中 CHL1 不仅表达于神经元中，在胶质细胞中同样存在[6]。目前国内外对 CHL1 的研究主要集中在神经系统中，如 CHL1 是一种促神经元存活因子[7]；在中枢神经系统发育过程中，CHL1 通过外功能区的脱落和释放以可溶性底物结合形式促进轴突的形成[8]；通过与细胞外基质蛋白相结合，CHL1 介导整联蛋白依赖的细胞迁移[9]；中枢神经系统损伤可引起 CHL1 在具有再生轴突功能的神经元中高表达[10]；压力应激作用可导致小鼠海马区域 CHL1 表达下调[11]。同时，粘附分子 CHL1 基因突变是人类精神分裂症的主要病因[12]。

[0004] 随着 CHL1 研究的逐步深入，相关工具小鼠也应运而生。2002 年，M. Montag-Sallaz 等首次报道：通过基因打靶和同源重组技术获得 CHL1 基因敲除小鼠，并用于实验研究。CHL1 基因缺失小鼠可以正常的存活和繁殖，但在神经突起的发育和成年后的学习和记忆方面存在一定的缺陷[13]。有研究显示：CHL1 基因缺失后，皮层神经元的突起倒置增多，小鼠的学习和认知行为学受到了影响[14]；近年来粘附分子在损伤修复中的报道也引起了关注，2007 年 Jakovcevski 等研究发现脊髓损伤后 CHL1 基因缺失的小鼠，可通过抑制胶质细胞所致的疤痕形成，而促进脊髓损伤后的功能恢复[15]；发明人的研究发现：不同低氧条件下 CHL1 在不同脑区、心、肺、肾中的表达显著下调[16]。提示，细胞粘附分子 CHL1 可能作为低氧损伤的标志分子，用于临床诊断。

发明内容

[0005] 本发明的目的在于提供一种低氧标志分子 CHL1 及其在制备低氧诊断试剂盒方面的应用。

[0006] 一种低氧标志分子，该标志分子为 CHL1，其蛋白序列如 SEQ ID No.1 或 SEQ ID No.2 所示。

[0007] 所述低氧标志分子在制备动物及人低氧检测试剂盒中的应用。

[0008] 所述动物为鼠。

[0009] 所述试剂盒包括酶标板、CHL1 抗体，酶标二抗，以及酶联免疫反应常用的试剂。

[0010] 所述酶标二抗中的酶为辣根过氧化物酶。

[0011] 本发明的有益效果：本发明的细胞粘附分子 CHL1 可作为一种低氧标志分子，应用免疫学方法，利用该标志物分子制备的抗体和酶标二抗，利用酶联免疫学检测方法，可检测动物及人是否处于低氧状态，检测灵敏可靠。

附图说明

[0012] 图 1 为 ELISA 检测急性低氧处理 24h 后小鼠血浆中 CHL1 含量的结果。

[0013] 图 2 为 ELISA 检测慢性低氧 14d、28d 后小鼠血浆中 CHL1 含量的结果。

[0014] 图 3 为 ELISA 检测海拔 3000m、4800m 米高原低氧下人血浆中 CHL1 含量的结果。

具体实施方式

[0015] 下面结合附图和具体实施例对本发明做进一步说明。

[0016] 以下实施例所用材料蛋白 CHL1，其蛋白序列如 SEQ ID No.1 或 SEQ ID No.2 所示。

[0017] 实施例 1 小鼠低氧实验

[0018] (1) 急性低氧

[0019] 将 40 只平均体重 22 ～ 24g 的 C57 小鼠（由军事医学科学院动物中心提供）分为 2 组，每组 20 只，分别是对照组、急性低氧组。实验动物分别在常氧、低氧舱中（给予 5000 米低压低氧）处理 24h。低氧舱以 20 米 / 秒的速度匀速升至 5000 米，实验结束后以 20 米 / 秒速度匀速降至常氧。低氧处理结束后立即摘眼球取血，用于 CHL1 的检测。

[0020] (2) 慢性低氧

[0021] 将 60 只平均体重 22 ～ 24g 的 C57 小鼠（由军事医学科学院动物中心提供）分为 3 组，每组 20 只，分别是对照组、慢性低氧 14 天组、慢性低氧 28 天组。实验组动物分别在常氧、低氧舱中给予 10％ O_2低氧处理 14 天、28 天。低氧舱提前将氧浓度降至 10％，实验当日将小鼠放入低氧舱，分别在 14 天、28 天后取出，立即摘眼球取血，用于 CHL1 的检测。

[0022] (3) 血浆的提取

[0023] 将采取的血液置含有抗凝剂（乙二胺四乙酸二钾）的试管中，混合后，以 3000rpm 离心 10min，使之与血细胞分离，分取上清液即为血浆。血浆保存在 -80 度备用。

[0024] (4) 酶联免疫检测所提取的血浆中 CHL1 含量

[0025] 试剂：

[0026] 1、碳酸盐包被液：3.03g Na_2CO_3，6.0g $NaHCO_3$，溶解于 900ml 双蒸水，调整 pH 至 9.6，定容至 1L；

[0027] 2、PBS：1.16g Na_2HPO_4，0.1g KCl，0.1g K_3PO_4，4.0g NaCl，溶于 500mL 蒸馏水，调整

pH 至 7.4 ;

[0028] 3、封闭液 :溶于 PBS 的 1% BSA,5%脱脂牛奶 ;

[0029] 4、洗涤液 :TBST(Tris-HCl,pH7.4+0.05%吐温 20) ;

[0030] 5、抗体或抗原稀释液 :1× 封闭液 ;

[0031] 6、终止液 :2N H_2SO_4。

[0032] 操作步骤 :

[0033] a、包被抗体 :将碳酸盐包被液稀释的 CHL1 抗体加入 96 孔酶标板中,CHL1 抗体浓度为 1μg/ml,每孔 100μl,盖上膜板包被 4 度过夜。

[0034] b、弃去包被液用洗涤液洗涤 2 次,轻拍孔板使洗涤液甩干。

[0035] c、封闭 :每孔中加入 200μl 封闭液 (1% BSA 或 5%脱脂牛奶等) 室温封闭 1 小时。

[0036] d、每孔加入 100μl 稀释好的样品 (2μl 血浆 +98μl 稀释液),37 度孵育 60 ～ 90 分钟。

[0037] e、甩去孔板里面的溶液,洗涤液洗涤 3 次,每次 10 分钟。

[0038] f、每孔加入 100μl 的检测抗体 (1 ： 500 稀释),室温孵育 2 小时。

[0039] g、孵育后洗涤液洗涤 4 次,每次 10 分钟。

[0040] h、每孔加入 100μl 的辣根过氧化物酶标记的二抗 (1 ： 500),继续室温孵育 1-2 小时。

[0041] i、孵育后洗涤液洗涤四次。

[0042] j、每孔加入 100μl 的 TMB 底物溶液,待显色充分后加入 100μl 的终止液并在酶标仪上测定 450nm 吸光度值。

[0043] 检测结果如图 1 和图 2 所示,急性低氧小鼠的 450nm 吸光度值为 0.625,正常小鼠的为 0.278,两者的差异达到了极显著的区别,慢性低氧 14 天和 18 天的吸光度值分别为 0.398 和 0.425,达到了显著水平,说明 CHL1 可作为低氧标志分子,并且可以根据此实验制备相应的低氧检测试剂盒。

[0044] 实施例 2 人低氧实验

[0045] (1) 模拟高原低氧 :随机选取 10 名志愿者进入低氧舱,分别在常氧、模拟海拔 3600m、海拔 4800m 低氧环境下静脉取血,用于 CHL1 的检测。

[0046] (2) 血浆的提取

[0047] 将采取的血液置含有抗凝剂 (乙二胺四乙酸二钾) 的试管中,混合后,以 3000rpm 离心 10min,使之与血细胞分离,分取上清液即为血浆。血浆保存在 -80 度备用。

[0048] (3) 酶联免疫检测所提取的血浆中 CH1 含量

[0049] 试剂 :

[0050] 1、碳酸盐包被液 :3.03g Na_2CO_3,6.0g $NaHCO_3$,溶解于 900ml 双蒸水,调整 pH 至 9.6,定容至 1L ;

[0051] 2、PBS :1.16g Na_2HPO_4,0.1g KCl,0.1g K_3PO_4,4.0g NaCl,溶于 500mL 蒸馏水,调整 pH 至 7.4 ;

[0052] 4、封闭液 :溶于 PBS 的 1% BSA,5%脱脂牛奶 ;

[0053] 4、洗涤液 :TBST(Tris-HCl,pH7.4+0.05%吐温 20) ;

[0054] 5、抗体或抗原稀释液：1× 封闭液；

[0055] 6、终止液：2N H_2SO_4。

[0056] 操作步骤：

[0057] a、包被抗体：将碳酸盐包被液稀释的 CHL1 抗体加入 96 孔酶标板中，CHL1 抗体浓度为 1μg/ml，每孔 100μl，盖上膜板包被 4 度过夜。

[0058] b、弃去包被液用洗涤液洗涤 2 次，轻拍孔板使洗涤液甩干。

[0059] c、封闭：每孔中加入 200μl 封闭液（1% BSA 或 5%脱脂牛奶等）室温封闭 1 小时。

[0060] d、每孔加入 100μl 稀释好的样品（2μl 血浆 +98μl 稀释液），37 度孵育 60 ～ 90 分钟。

[0061] e、甩去孔板里面的溶液，洗涤液洗涤 3 次，每次 10 分钟。

[0062] f、每孔加入 100μl 的检测抗体（1 ： 500 稀释），室温孵育 2 小时。

[0063] g、孵育后洗涤液洗涤 4 次，每次 10 分钟。

[0064] h、每孔加入 100μl 的辣根过氧化物酶标记的二抗（1 ： 500），继续室温孵育 1-2 小时。

[0065] i、孵育后洗涤液洗涤四次。

[0066] j、每孔加入 100μl 的 TMB 底物溶液，待显色充分后加入 100μl 的终止液并在酶标仪上测定 450nm 吸光度值。

[0067] 检测结果如图 3 所示，正常人 450nm 吸光度值为 0.255，模拟海拔 3600m 低氧处理的人的吸光度值为 0.314，模拟海拔 4800m 低氧处理的人的吸光度值为 0.356，说明 CHL1 可作为低氧标志分子，并且可以根据此实验制备相应的低氧检测试剂盒。

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[0001]

SEQUENCE LISTING

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Tyr Ala Thr Val Val Gly Tyr Ser Ala Phe Leu His Cys Glu Tyr Phe
435 440 445
Ala Ser Pro Lys Ala Thr Val Val Trp Glu Val Ala Asp Glu Thr His
450 455 460
Pro Leu Glu Gly Asp Arg Tyr His Thr His Glu Asn Gly Thr Leu Glu
465 470 475 480
Ile Tyr Arg Thr Thr Glu Glu Asp Ala Gly Ser Tyr Ser Cys Trp Val
485 490 495
Asp Asn Ala Met Gly Lys Ala Val Ile Thr Ala Asn Leu Asp Ile Arg
500 505 510
Asn Ala Thr Lys Leu Arg Val Ser Pro Lys Asn Pro Arg Ile Pro Lys
515 520 525
Ser His Val Leu Glu Leu Tyr Cys Glu Ser Gln Cys Asp Ser His Leu
530 535 540
Lys His Ser Leu Lys Leu Ser Trp Ser Lys Asp Gly Glu Ala Phe Glu
545 550 555 560
Met Asn Gly Thr Glu Asp Gly Arg Ile Val Ile Asp Gly Ala Tyr Leu
565 570 575
Thr Ile Ser Asn Ile Thr Ala Glu Asp Gln Gly Val Tyr Ser Cys Ser

[0003]

580 585 590

Ala Gln Thr Ser Leu Asp Ser Thr Ser Glu Lys Thr Gln Val Thr Val

595 600 605

Leu Gly Val Pro Asp Pro Pro Gly Asn Leu His Leu Ser Glu Arg Gln

610 615 620

Asn Arg Ser Val Arg Leu Ser Trp Glu Ala Gly Asp Asp His Asn Ser

625 630 635 640

Lys Ile Ser Glu Tyr Ile Val Glu Phe Glu Gly Asn Arg Glu Glu Pro

645 650 655

Gly Lys Trp Glu Glu Leu Thr Arg Val Gln Gly Glu Glu Thr Asp Val

660 665 670

Val Leu Ser Leu Ala Pro Tyr Val Arg Tyr Gln Phe Arg Val Thr Ala

675 680 685

Val Asn Glu Val Gly Arg Ser His Ala Ser Leu Pro Ser Asp His His

690 695 700

Glu Thr Pro Pro Ala Ala Pro Asp Lys Asn Pro Gln Asn Ile Arg Val

705 710 715 720

Gln Ala Ser Gln Pro Lys Glu Met Ile Ile Lys Trp Glu Pro Leu Lys

725 730 735

Ser Met Glu Gln Asn Gly Pro Gly Leu Glu Tyr Lys Val Ser Trp Lys

740 745 750

Pro Gln Gly Ala Pro Glu Glu Trp Glu Glu Glu Ile Val Thr Asn His

755 760 765

Thr Leu Arg Val Met Thr Pro Thr Val Tyr Ala Pro Tyr Asp Val Lys

770 775 780

Val Gln Ala Ile Asn Gln Leu Gly Ser Ser Pro Asp Pro Gln Pro Val

785 790 795 800

Thr Leu Tyr Ser Gly Glu Asp Tyr Pro Ser Thr Ala Pro Val Ile Gln

805 810 815

Arg Val Asp Val Met Asn Ser Thr Leu Val Lys Val Thr Trp Ser Ser

820 825 830

Ile Pro Lys Glu Thr Val His Gly Leu Leu Arg Gly Tyr Gln Ile Asn

835 840 845

Trp Trp Lys Thr Lys Ser Leu Leu Asp Gly Arg Thr His Pro Lys Glu

850 855 860

Val Asn Ile Leu Arg Phe Ser Gly Gln Arg Asn Ser Gly Met Val Pro

865 870 875 880

Ser Leu Asp Pro Phe Ser Glu Phe His Leu Thr Val Leu Ala Tyr Asn

885 890 895

Ser Lys Gly Ala Gly Pro Glu Ser Glu Pro Tyr Ile Phe Gln Thr Pro

900 905 910

Glu Gly Val Pro Glu Gln Pro Ser Phe Leu Lys Val Ile Lys Val Asp

915 920 925

Lys Asp Thr Ala Thr Leu Ser Trp Gly Leu Pro Lys Lys Leu Asn Gly

[0004]

930 935 940

Asn Leu Thr Gly Tyr Leu Leu Gln Tyr Gln Ile Ile Asn Asp Thr Tyr

945 950 955 960

Glu Leu Gly Glu Leu Asn Glu Ile Asn Val Thr Thr Pro Ser Lys Ser

965 970 975

Ser Trp His Leu Ser Asn Leu Asn Ser Thr Thr Lys Tyr Lys Phe Tyr

980 985 990

Leu Arg Ala Cys Thr Ser Arg Gly Cys Gly Lys Pro Ile Ser Glu Glu

995 1000 1005

Gly Ala Thr Leu Gly Glu Gly Ser Lys Gly Ile Arg Lys Ile Thr

1010 1015 1020

Glu Gly Val Asn Val Thr Gln Lys Ile His Pro Val Glu Val Leu

1025 1030 1035

Val Pro Gly Ala Glu His Ile Val His Leu Met Thr Lys Asn Trp

1040 1045 1050

Gly Asp Asn Asp Ser Ile Phe Gln Asp Val Ile Glu Thr Arg Gly

1055 1060 1065

Arg Glu Tyr Ala Gly Leu Tyr Asp Asp Ile Ser Thr Gln Gly Trp

1070 1075 1080

Phe Ile Gly Leu Met Cys Ala Ile Ala Leu Leu Thr Leu Ile Leu

1085 1090 1095

Leu Thr Ile Cys Phe Val Lys Arg Asn Arg Gly Gly Lys Tyr Ser

1100 1105 1110

Val Lys Glu Lys Glu Asp Leu His Pro Asp Pro Glu Val Gln Ser

1115 1120 1125

Ala Lys Asp Glu Thr Phe Gly Glu Tyr Ser Asp Ser Asp Glu Lys

1130 1135 1140

Pro Leu Lys Gly Ser Leu Arg Ser Leu Asn Arg Asn Met Gln Pro

1145 1150 1155

Thr Glu Ser Ala Asp Ser Leu Val Glu Tyr Gly Glu Gly Asp Gln

1160 1165 1170

Ser Ile Phe Asn Glu Asp Gly Ser Phe Ile Gly Ala Tyr Thr Gly

1175 1180 1185

Ala Lys Glu Lys Gly Ser Val Glu Ser Asn Gly Ser Ser Thr Ala

1190 1195 1200

Thr Phe Pro Leu Arg Ala

1205

<210> 2

<211> 1224

<212> PRT

<213> Homo sapiens

<400> 2

[0005]

Met Glu Pro Leu Leu Leu Gly Arg Gly Leu Ile Val Tyr Leu Met Phe
1 5 10 15
Leu Leu Leu Lys Phe Ser Lys Ala Ile Glu Ile Pro Ser Ser Val Gln
20 25 30
Gln Val Pro Thr Ile Ile Lys Gln Ser Lys Val Gln Val Ala Phe Pro
35 40 45
Phe Asp Glu Tyr Phe Gln Ile Glu Cys Glu Ala Lys Gly Asn Pro Glu
50 55 60
Pro Thr Phe Ser Trp Thr Lys Asp Gly Asn Pro Phe Tyr Phe Thr Asp
65 70 75 80
His Arg Ile Ile Pro Ser Asn Asn Ser Gly Thr Phe Arg Ile Pro Asn
85 90 95
Glu Gly His Ile Ser His Phe Gln Gly Lys Tyr Arg Cys Phe Ala Ser
100 105 110
Asn Lys Leu Gly Ile Ala Met Ser Glu Glu Ile Glu Phe Ile Val Pro
115 120 125
Ser Val Pro Lys Phe Pro Lys Glu Lys Ile Asp Pro Leu Glu Val Glu
130 135 140
Glu Gly Asp Pro Ile Val Leu Pro Cys Asn Pro Pro Lys Gly Leu Pro
145 150 155 160
Pro Leu His Ile Tyr Trp Met Asn Ile Glu Leu Glu His Ile Glu Gln
165 170 175
Asp Glu Arg Val Tyr Met Ser Gln Lys Gly Asp Leu Tyr Phe Ala Asn
180 185 190
Val Glu Glu Lys Asp Ser Arg Asn Asp Tyr Cys Cys Phe Ala Ala Phe
195 200 205
Pro Arg Leu Arg Thr Ile Val Gln Lys Met Pro Met Lys Leu Thr Val
210 215 220
Asn Ser Leu Lys His Ala Asn Asp Ser Ser Ser Ser Thr Glu Ile Gly
225 230 235 240
Ser Lys Ala Asn Ser Ile Lys Gln Arg Lys Pro Lys Leu Leu Leu Pro
245 250 255
Pro Thr Glu Ser Gly Ser Glu Ser Ser Ile Thr Ile Leu Lys Gly Glu
260 265 270
Ile Leu Leu Leu Glu Cys Phe Ala Glu Gly Leu Pro Thr Pro Gln Val
275 280 285

Asp Trp Asn Lys Ile Gly Gly Asp Leu Pro Lys Gly Arg Glu Thr Lys
290 295 300
Glu Asn Tyr Gly Lys Thr Leu Lys Ile Glu Asn Val Ser Tyr Gln Asp
305 310 315 320
Lys Gly Asn Tyr Arg Cys Thr Ala Ser Asn Phe Leu Gly Thr Ala Thr
325 330 335

[0006]

His Asp Phe His Val Ile Val Glu Glu Pro Pro Arg Trp Thr Lys Lys
340 345 350
Pro Gln Ser Ala Val Tyr Ser Thr Gly Ser Asn Gly Ile Leu Leu Cys
355 360 365
Glu Ala Glu Gly Glu Pro Gln Pro Thr Ile Lys Trp Arg Val Asn Gly
370 375 380
Ser Pro Val Asp Asn His Pro Phe Ala Gly Asp Val Val Phe Pro Arg
385 390 395 400
Glu Ile Ser Phe Thr Asn Leu Gln Pro Asn His Thr Ala Val Tyr Gln
405 410 415
Cys Glu Ala Ser Asn Val His Gly Thr Ile Leu Ala Asn Ala Asn Ile
420 425 430
Asp Val Val Asp Val Arg Pro Leu Ile Gln Thr Lys Asp Gly Glu Asn
435 440 445
Tyr Ala Thr Val Val Gly Tyr Ser Ala Phe Leu His Cys Glu Phe Phe
450 455 460
Ala Ser Pro Glu Ala Val Val Ser Trp Gln Lys Val Glu Glu Val Lys
465 470 475 480
Pro Leu Glu Gly Arg Arg Tyr His Ile Tyr Glu Asn Gly Thr Leu Gln
485 490 495
Ile Asn Arg Thr Thr Glu Glu Asp Ala Gly Ser Tyr Ser Cys Trp Val
500 505 510
Glu Asn Ala Ile Gly Lys Thr Ala Val Thr Ala Asn Leu Asp Ile Arg
515 520 525
Asn Ala Thr Lys Leu Arg Val Ser Pro Lys Asn Pro Arg Ile Pro Lys
530 535 540
Leu His Met Leu Glu Leu His Cys Glu Ser Lys Cys Asp Ser His Leu
545 550 555 560
Lys His Ser Leu Lys Leu Ser Trp Ser Lys Asp Gly Glu Ala Phe Glu
565 570 575
Ile Asn Gly Thr Glu Asp Gly Arg Ile Ile Ile Asp Gly Ala Asn Leu
580 585 590
Thr Ile Ser Asn Val Thr Leu Glu Asp Gln Gly Ile Tyr Cys Cys Ser
595 600 605
Ala His Thr Ala Leu Asp Ser Ala Ala Asp Ile Thr Gln Val Thr Val
610 615 620
Leu Asp Val Pro Asp Pro Pro Glu Asn Leu His Leu Ser Glu Arg Gln
625 630 635 640
Asn Arg Ser Val Arg Leu Thr Trp Glu Ala Gly Ala Asp His Asn Ser
645 650 655
Asn Ile Ser Glu Tyr Ile Val Glu Phe Glu Gly Asn Lys Glu Glu Pro
660 665 670
Gly Arg Trp Glu Glu Leu Thr Arg Val Gln Gly Lys Lys Thr Thr Val
675 680 685

[0007]

Ile Leu Pro Leu Ala Pro Phe Val Arg Tyr Gln Phe Arg Val Ile Ala
690 695 700
Val Asn Glu Val Gly Arg Ser Gln Pro Ser Gln Pro Ser Asp His His
705 710 715 720
Glu Thr Pro Pro Ala Ala Pro Asp Arg Asn Pro Gln Asn Ile Arg Val
725 730 735
Gln Ala Ser Gln Pro Lys Glu Met Ile Ile Lys Trp Glu Pro Leu Lys
740 745 750
Ser Met Glu Gln Asn Gly Pro Gly Leu Glu Tyr Arg Val Thr Trp Lys
755 760 765
Pro Gln Gly Ala Pro Val Glu Trp Glu Glu Glu Thr Val Thr Asn His
770 775 780
Thr Leu Arg Val Met Thr Pro Ala Val Tyr Ala Pro Tyr Asp Val Lys
785 790 795 800
Val Gln Ala Ile Asn Gln Leu Gly Ser Gly Pro Asp Pro Gln Ser Val
805 810 815
Thr Leu Tyr Ser Gly Glu Asp Tyr Pro Asp Thr Ala Pro Val Ile His
820 825 830
Gly Val Asp Val Ile Asn Ser Thr Leu Val Lys Val Thr Trp Ser Thr
835 840 845
Val Pro Lys Asp Arg Val His Gly Arg Leu Lys Gly Tyr Gln Ile Asn
850 855 860
Trp Trp Lys Thr Lys Ser Leu Leu Asp Gly Arg Thr His Pro Lys Glu
865 870 875 880
Val Asn Ile Leu Arg Phe Ser Gly Gln Arg Asn Ser Gly Met Val Pro
885 890 895
Ser Leu Asp Ala Phe Ser Glu Phe His Leu Thr Val Leu Ala Tyr Asn
900 905 910
Ser Lys Gly Ala Gly Pro Glu Ser Glu Pro Tyr Ile Phe Gln Thr Pro
915 920 925
Glu Gly Val Pro Glu Gln Pro Thr Phe Leu Lys Val Ile Lys Val Asp
930 935 940
Lys Asp Thr Ala Thr Leu Ser Trp Gly Leu Pro Lys Lys Leu Asn Gly
945 950 955 960
Asn Leu Thr Gly Tyr Leu Leu Gln Tyr Gln Ile Ile Asn Asp Thr Tyr
965 970 975
Glu Ile Gly Glu Leu Asn Asp Ile Asn Ile Thr Thr Pro Ser Lys Pro
980 985 990
Ser Trp His Leu Ser Asn Leu Asn Ala Thr Thr Lys Tyr Lys Phe Tyr
995 1000 1005
Leu Arg Ala Cys Thr Ser Gln Gly Cys Gly Lys Pro Ile Thr Glu
1010 1015 1020
Glu Ser Ser Thr Leu Gly Glu Gly Ser Lys Gly Ile Gly Lys Ile
1025 1030 1035

[0008]

Ser Gly Val Asn Leu Thr Gln Lys Thr His Pro Ile Glu Val Phe
1040 1045 1050
Glu Pro Gly Ala Glu His Ile Val Arg Leu Met Thr Lys Asn Trp
1055 1060 1065
Gly Asp Asn Asp Ser Ile Phe Gln Asp Val Ile Glu Thr Arg Gly
1070 1075 1080
Arg Glu Tyr Ala Gly Leu Tyr Asp Asp Ile Ser Thr Gln Gly Trp
1085 1090 1095
Phe Ile Gly Leu Met Cys Ala Ile Ala Leu Leu Thr Leu Leu Leu
1100 1105 1110
Leu Thr Val Cys Phe Val Lys Arg Asn Arg Gly Gly Lys Tyr Ser
1115 1120 1125
Val Lys Glu Lys Glu Asp Leu His Pro Asp Pro Glu Ile Gln Ser
1130 1135 1140
Val Lys Asp Glu Thr Phe Gly Glu Tyr Ser Asp Ser Asp Glu Lys
1145 1150 1155
Pro Leu Lys Gly Ser Leu Arg Ser Leu Asn Arg Asp Met Gln Pro
1160 1165 1170
Thr Glu Ser Ala Asp Ser Leu Val Glu Tyr Gly Glu Gly Asp His
1175 1180 1185
Gly Leu Phe Ser Glu Asp Gly Ser Phe Ile Gly Ala Tyr Ala Gly
1190 1195 1200
Ser Lys Glu Lys Gly Ser Val Glu Ser Asn Gly Ser Ser Thr Ala
1205 1210 1215
Thr Phe Pro Leu Arg Ala
1220

[0009]

seq.txt

SEQUENCE LISTING

<110> 中国人民解放军军事医学科学院基础医学研究所

<120> 低氧标志分子CHL1及其应用

<130> 1111

<160> 2

<170> PatentIn version 3.5

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<211> 1209
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<400> 1

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Phe Leu Leu Leu Lys Leu Ser Ala Ala Glu Ile Pro Leu Ser Val Gln
20 25 30

Gln Val Pro Thr Ile Val Lys Gln Ser Tyr Val Gln Val Ala Phe Pro
35 40 45

Phe Asp Glu Tyr Phe Gln Ile Glu Cys Glu Ala Lys Gly Asn Pro Glu
50 55 60

Pro Ile Phe Ser Trp Thr Lys Asp Asp Lys Pro Phe Asp Leu Ser Asp
65 70 75 80

Pro Arg Ile Ile Ala Ala Asn Asn Ser Gly Thr Phe Lys Ile Pro Asn
85 90 95

Glu Gly His Ile Ser His Phe Gln Gly Lys Tyr Arg Cys Phe Ala Ser
100 105 110

Asn Arg Leu Gly Thr Ala Val Ser Glu Glu Ile Glu Phe Ile Val Pro
115 120 125

Gly Val Pro Lys Phe Pro Lys Glu Lys Ile Glu Pro Ile Asp Val Glu
130 135 140

Glu Gly Asp Ser Ile Val Leu Pro Cys Asn Pro Pro Lys Gly Leu Pro
145 150 155 160

Pro Leu His Ile Tyr Trp Met Asn Ile Glu Leu Glu His Ile Glu Gln
165 170 175

Asp Glu Arg Val Tyr Met Ser Gln Arg Gly Asp Leu Tyr Phe Ala Asn
180 185 190

Val Glu Glu Asn Asp Ser Arg Asn Asp Tyr Cys Cys Phe Ala Ala Phe
195 200 205

Pro Lys Leu Arg Thr Ile Val Gln Lys Met Pro Met Lys Leu Thr Val
210 215 220

[0010]

seq.txt

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Asn Ser Ser Asn Ser Ile Lys Gln Arg Lys Pro Lys Leu Leu Leu Pro
225                 230                 235                 240

Pro Ala Gln Met Gly Ser Leu Ser Ala Lys Thr Val Leu Lys Gly Asp
                245                 250                 255

Thr Leu Leu Leu Glu Cys Phe Ala Glu Gly Leu Pro Thr Pro His Ile
            260                 265                 270

Gln Trp Ser Lys Pro Gly Ser Glu Leu Pro Glu Gly Arg Ala Thr Ile
        275                 280                 285

Glu Val His Glu Lys Thr Leu Lys Ile Glu Asn Ile Ser Tyr Gln Asp
    290                 295                 300

Arg Gly Asn Tyr Arg Cys Thr Ala Asn Asn Leu Leu Gly Lys Ala Ser
305                 310                 315                 320

His Asp Phe His Val Thr Val Glu Glu Pro Pro Arg Trp Lys Lys Lys
                325                 330                 335

Pro Gln Ser Ala Val Tyr Ser Thr Gly Ser Ser Gly Ile Leu Leu Cys
            340                 345                 350

Glu Ala Glu Gly Glu Pro Gln Pro Thr Ile Lys Trp Arg Leu Asn Gly
        355                 360                 365

Leu Pro Ile Glu Lys His Pro Phe Pro Gly Asp Phe Met Phe Pro Arg
    370                 375                 380

Glu Ile Ser Phe Thr Asn Leu Leu Pro Asn His Thr Gly Val Tyr Gln
385                 390                 395                 400

Cys Glu Ala Ser Asn Ile His Gly Thr Ile Leu Ala Asn Ala Asn Ile
                405                 410                 415

Asp Val Ile Asp Val Ile Pro Leu Ile Lys Thr Lys Asn Glu Glu Asn
            420                 425                 430

Tyr Ala Thr Val Val Gly Tyr Ser Ala Phe Leu His Cys Glu Tyr Phe
        435                 440                 445

Ala Ser Pro Lys Ala Thr Val Val Trp Glu Val Ala Asp Glu Thr His
    450                 455                 460

Pro Leu Glu Gly Asp Arg Tyr His Thr His Glu Asn Gly Thr Leu Glu
465                 470                 475                 480

Ile Tyr Arg Thr Thr Glu Glu Asp Ala Gly Ser Tyr Ser Cys Trp Val
                485                 490                 495

Asp Asn Ala Met Gly Lys Ala Val Ile Thr Ala Asn Leu Asp Ile Arg
            500                 505                 510

Asn Ala Thr Lys Leu Arg Val Ser Pro Lys Asn Pro Arg Ile Pro Lys
        515                 520                 525
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[0011]

seq.txt

Ser His Val Leu Glu Leu Tyr Cys Glu Ser Gln Cys Asp Ser His Leu
530 535 540

Lys His Ser Leu Lys Leu Ser Trp Ser Lys Asp Gly Glu Ala Phe Glu
545 550 555 560

Met Asn Gly Thr Glu Asp Gly Arg Ile Val Ile Asp Gly Ala Tyr Leu
565 570 575

Thr Ile Ser Asn Ile Thr Ala Glu Asp Gln Gly Val Tyr Ser Cys Ser
580 585 590

Ala Gln Thr Ser Leu Asp Ser Thr Ser Glu Lys Thr Gln Val Thr Val
595 600 605

Leu Gly Val Pro Asp Pro Pro Gly Asn Leu His Leu Ser Glu Arg Gln
610 615 620

Asn Arg Ser Val Arg Leu Ser Trp Glu Ala Gly Asp Asp His Asn Ser
625 630 635 640

Lys Ile Ser Glu Tyr Ile Val Glu Phe Glu Gly Asn Arg Glu Glu Pro
645 650 655

Gly Lys Trp Glu Glu Leu Thr Arg Val Gln Gly Glu Glu Thr Asp Val
660 665 670

Val Leu Ser Leu Ala Pro Tyr Val Arg Tyr Gln Phe Arg Val Thr Ala
675 680 685

Val Asn Glu Val Gly Arg Ser His Ala Ser Leu Pro Ser Asp His His
690 695 700

Glu Thr Pro Pro Ala Ala Pro Asp Lys Asn Pro Gln Asn Ile Arg Val
705 710 715 720

Gln Ala Ser Gln Pro Lys Glu Met Ile Ile Lys Trp Glu Pro Leu Lys
725 730 735

Ser Met Glu Gln Asn Gly Pro Gly Leu Glu Tyr Lys Val Ser Trp Lys
740 745 750

Pro Gln Gly Ala Pro Glu Glu Trp Glu Glu Glu Ile Val Thr Asn His
755 760 765

Thr Leu Arg Val Met Thr Pro Thr Val Tyr Ala Pro Tyr Asp Val Lys
770 775 780

Val Gln Ala Ile Asn Gln Leu Gly Ser Ser Pro Asp Pro Gln Pro Val
785 790 795 800

Thr Leu Tyr Ser Gly Glu Asp Tyr Pro Ser Thr Ala Pro Val Ile Gln
805 810 815

Arg Val Asp Val Met Asn Ser Thr Leu Val Lys Val Thr Trp Ser Ser
820 825 830

[0012]

seq.txt

Ile Pro Lys Glu Thr Val His Gly Leu Leu Arg Gly Tyr Gln Ile Asn
835 840 845

Trp Trp Lys Thr Lys Ser Leu Leu Asp Gly Arg Thr His Pro Lys Glu
850 855 860

Val Asn Ile Leu Arg Phe Ser Gly Gln Arg Asn Ser Gly Met Val Pro
865 870 875 880

Ser Leu Asp Pro Phe Ser Glu Phe His Leu Thr Val Leu Ala Tyr Asn
885 890 895

Ser Lys Gly Ala Gly Pro Glu Ser Glu Pro Tyr Ile Phe Gln Thr Pro
900 905 910

Glu Gly Val Pro Glu Gln Pro Ser Phe Leu Lys Val Ile Lys Val Asp
915 920 925

Lys Asp Thr Ala Thr Leu Ser Trp Gly Leu Pro Lys Lys Leu Asn Gly
930 935 940

Asn Leu Thr Gly Tyr Leu Leu Gln Tyr Gln Ile Ile Asn Asp Thr Tyr
945 950 955 960

Glu Leu Gly Glu Leu Asn Glu Ile Asn Val Thr Thr Pro Ser Lys Ser
965 970 975

Ser Trp His Leu Ser Asn Leu Asn Ser Thr Thr Lys Tyr Lys Phe Tyr
980 985 990

Leu Arg Ala Cys Thr Ser Arg Gly Cys Gly Lys Pro Ile Ser Glu Glu
995 1000 1005

Gly Ala Thr Leu Gly Glu Gly Ser Lys Gly Ile Arg Lys Ile Thr
1010 1015 1020

Glu Gly Val Asn Val Thr Gln Lys Ile His Pro Val Glu Val Leu
1025 1030 1035

Val Pro Gly Ala Glu His Ile Val His Leu Met Thr Lys Asn Trp
1040 1045 1050

Gly Asp Asn Asp Ser Ile Phe Gln Asp Val Ile Glu Thr Arg Gly
1055 1060 1065

Arg Glu Tyr Ala Gly Leu Tyr Asp Asp Ile Ser Thr Gln Gly Trp
1070 1075 1080

Phe Ile Gly Leu Met Cys Ala Ile Ala Leu Leu Thr Leu Ile Leu
1085 1090 1095

Leu Thr Ile Cys Phe Val Lys Arg Asn Arg Gly Gly Lys Tyr Ser
1100 1105 1110

Val Lys Glu Lys Glu Asp Leu His Pro Asp Pro Glu Val Gln Ser

[0013]

seq.txt

1115 1120 1125

Ala Lys Asp Glu Thr Phe Gly Glu Tyr Ser Asp Ser Asp Glu Lys
1130 1135 1140

Pro Leu Lys Gly Ser Leu Arg Ser Leu Asn Arg Asn Met Gln Pro
1145 1150 1155

Thr Glu Ser Ala Asp Ser Leu Val Glu Tyr Gly Glu Gly Asp Gln
1160 1165 1170

Ser Ile Phe Asn Glu Asp Gly Ser Phe Ile Gly Ala Tyr Thr Gly
1175 1180 1185

Ala Lys Glu Lys Gly Ser Val Glu Ser Asn Gly Ser Ser Thr Ala
1190 1195 1200

Thr Phe Pro Leu Arg Ala
1205

<210> 2
<211> 1224
<212> PRT
<213> Homo sapiens

<400> 2

Met Glu Pro Leu Leu Leu Gly Arg Gly Leu Ile Val Tyr Leu Met Phe
1 5 10 15

Leu Leu Leu Lys Phe Ser Lys Ala Ile Glu Ile Pro Ser Ser Val Gln
20 25 30

Gln Val Pro Thr Ile Ile Lys Gln Ser Lys Val Gln Val Ala Phe Pro
35 40 45

Phe Asp Glu Tyr Phe Gln Ile Glu Cys Glu Ala Lys Gly Asn Pro Glu
50 55 60

Pro Thr Phe Ser Trp Thr Lys Asp Gly Asn Pro Phe Tyr Phe Thr Asp
65 70 75 80

His Arg Ile Ile Pro Ser Asn Asn Ser Gly Thr Phe Arg Ile Pro Asn
85 90 95

Glu Gly His Ile Ser His Phe Gln Gly Lys Tyr Arg Cys Phe Ala Ser
100 105 110

Asn Lys Leu Gly Ile Ala Met Ser Glu Glu Ile Glu Phe Ile Val Pro
115 120 125

Ser Val Pro Lys Phe Pro Lys Glu Lys Ile Asp Pro Leu Glu Val Glu
130 135 140

Glu Gly Asp Pro Ile Val Leu Pro Cys Asn Pro Pro Lys Gly Leu Pro
145 150 155 160

Pro Leu His Ile Tyr Trp Met Asn Ile Glu Leu Glu His Ile Glu Gln

[0014]

seq.txt

165 170 175

Asp Glu Arg Val Tyr Met Ser Gln Lys Gly Asp Leu Tyr Phe Ala Asn
180 185 190

Val Glu Glu Lys Asp Ser Arg Asn Asp Tyr Cys Cys Phe Ala Ala Phe
195 200 205

Pro Arg Leu Arg Thr Ile Val Gln Lys Met Pro Met Lys Leu Thr Val
210 215 220

Asn Ser Leu Lys His Ala Asn Asp Ser Ser Ser Ser Thr Glu Ile Gly
225 230 235 240

Ser Lys Ala Asn Ser Ile Lys Gln Arg Lys Pro Lys Leu Leu Leu Pro
245 250 255

Pro Thr Glu Ser Gly Ser Glu Ser Ser Ile Thr Ile Leu Lys Gly Glu
260 265 270

Ile Leu Leu Leu Glu Cys Phe Ala Glu Gly Leu Pro Thr Pro Gln Val
275 280 285

Asp Trp Asn Lys Ile Gly Gly Asp Leu Pro Lys Gly Arg Glu Thr Lys
290 295 300

Glu Asn Tyr Gly Lys Thr Leu Lys Ile Glu Asn Val Ser Tyr Gln Asp
305 310 315 320

Lys Gly Asn Tyr Arg Cys Thr Ala Ser Asn Phe Leu Gly Thr Ala Thr
325 330 335

His Asp Phe His Val Ile Val Glu Glu Pro Pro Arg Trp Thr Lys Lys
340 345 350

Pro Gln Ser Ala Val Tyr Ser Thr Gly Ser Asn Gly Ile Leu Leu Cys
355 360 365

Glu Ala Glu Gly Glu Pro Gln Pro Thr Ile Lys Trp Arg Val Asn Gly
370 375 380

Ser Pro Val Asp Asn His Pro Phe Ala Gly Asp Val Val Phe Pro Arg
385 390 395 400

Glu Ile Ser Phe Thr Asn Leu Gln Pro Asn His Thr Ala Val Tyr Gln
405 410 415

Cys Glu Ala Ser Asn Val His Gly Thr Ile Leu Ala Asn Ala Asn Ile
420 425 430

Asp Val Val Asp Val Arg Pro Leu Ile Gln Thr Lys Asp Gly Glu Asn
435 440 445

Tyr Ala Thr Val Val Gly Tyr Ser Ala Phe Leu His Cys Glu Phe Phe
450 455 460

[0015]

seq.txt

Ala Ser Pro Glu Ala Val Val Ser Trp Gln Lys Val Glu Glu Val Lys
465 470 475 480

Pro Leu Glu Gly Arg Arg Tyr His Ile Tyr Glu Asn Gly Thr Leu Gln
485 490 495

Ile Asn Arg Thr Thr Glu Glu Asp Ala Gly Ser Tyr Ser Cys Trp Val
500 505 510

Glu Asn Ala Ile Gly Lys Thr Ala Val Thr Ala Asn Leu Asp Ile Arg
515 520 525

Asn Ala Thr Lys Leu Arg Val Ser Pro Lys Asn Pro Arg Ile Pro Lys
530 535 540

Leu His Met Leu Glu Leu His Cys Glu Ser Lys Cys Asp Ser His Leu
545 550 555 560

Lys His Ser Leu Lys Leu Ser Trp Ser Lys Asp Gly Glu Ala Phe Glu
565 570 575

Ile Asn Gly Thr Glu Asp Gly Arg Ile Ile Ile Asp Gly Ala Asn Leu
580 585 590

Thr Ile Ser Asn Val Thr Leu Glu Asp Gln Gly Ile Tyr Cys Cys Ser
595 600 605

Ala His Thr Ala Leu Asp Ser Ala Ala Asp Ile Thr Gln Val Thr Val
610 615 620

Leu Asp Val Pro Asp Pro Pro Glu Asn Leu His Leu Ser Glu Arg Gln
625 630 635 640

Asn Arg Ser Val Arg Leu Thr Trp Glu Ala Gly Ala Asp His Asn Ser
645 650 655

Asn Ile Ser Glu Tyr Ile Val Glu Phe Glu Gly Asn Lys Glu Glu Pro
660 665 670

Gly Arg Trp Glu Glu Leu Thr Arg Val Gln Gly Lys Lys Thr Thr Val
675 680 685

Ile Leu Pro Leu Ala Pro Phe Val Arg Tyr Gln Phe Arg Val Ile Ala
690 695 700

Val Asn Glu Val Gly Arg Ser Gln Pro Ser Gln Pro Ser Asp His His
705 710 715 720

Glu Thr Pro Pro Ala Ala Pro Asp Arg Asn Pro Gln Asn Ile Arg Val
725 730 735

Gln Ala Ser Gln Pro Lys Glu Met Ile Ile Lys Trp Glu Pro Leu Lys
740 745 750

Ser Met Glu Gln Asn Gly Pro Gly Leu Glu Tyr Arg Val Thr Trp Lys
755 760 765

[0016]

Pro Gln Gly Ala Pro Val Glu Trp Glu Glu Glu Thr Val Thr Asn His
770 775 780

Thr Leu Arg Val Met Thr Pro Ala Val Tyr Ala Pro Tyr Asp Val Lys
785 790 795 800

Val Gln Ala Ile Asn Gln Leu Gly Ser Gly Pro Asp Pro Gln Ser Val
805 810 815

Thr Leu Tyr Ser Gly Glu Asp Tyr Pro Asp Thr Ala Pro Val Ile His
820 825 830

Gly Val Asp Val Ile Asn Ser Thr Leu Val Lys Val Thr Trp Ser Thr
835 840 845

Val Pro Lys Asp Arg Val His Gly Arg Leu Lys Gly Tyr Gln Ile Asn
850 855 860

Trp Trp Lys Thr Lys Ser Leu Leu Asp Gly Arg Thr His Pro Lys Glu
865 870 875 880

Val Asn Ile Leu Arg Phe Ser Gly Gln Arg Asn Ser Gly Met Val Pro
885 890 895

Ser Leu Asp Ala Phe Ser Glu Phe His Leu Thr Val Leu Ala Tyr Asn
900 905 910

Ser Lys Gly Ala Gly Pro Glu Ser Glu Pro Tyr Ile Phe Gln Thr Pro
915 920 925

Glu Gly Val Pro Glu Gln Pro Thr Phe Leu Lys Val Ile Lys Val Asp
930 935 940

Lys Asp Thr Ala Thr Leu Ser Trp Gly Leu Pro Lys Lys Leu Asn Gly
945 950 955 960

Asn Leu Thr Gly Tyr Leu Leu Gln Tyr Gln Ile Ile Asn Asp Thr Tyr
965 970 975

Glu Ile Gly Glu Leu Asn Asp Ile Asn Ile Thr Thr Pro Ser Lys Pro
980 985 990

Ser Trp His Leu Ser Asn Leu Asn Ala Thr Thr Lys Tyr Lys Phe Tyr
995 1000 1005

Leu Arg Ala Cys Thr Ser Gln Gly Cys Gly Lys Pro Ile Thr Glu
1010 1015 1020

Glu Ser Ser Thr Leu Gly Glu Gly Ser Lys Gly Ile Gly Lys Ile
1025 1030 1035

Ser Gly Val Asn Leu Thr Gln Lys Thr His Pro Ile Glu Val Phe
1040 1045 1050

Glu Pro Gly Ala Glu His Ile Val Arg Leu Met Thr Lys Asn Trp
1055 1060 1065

[0017]

seq.txt

Gly Asp Asn Asp Ser Ile Phe Gln Asp Val Ile Glu Thr Arg Gly
1070 1075 1080

Arg Glu Tyr Ala Gly Leu Tyr Asp Asp Ile Ser Thr Gln Gly Trp
1085 1090 1095

Phe Ile Gly Leu Met Cys Ala Ile Ala Leu Leu Thr Leu Leu Leu
1100 1105 1110

Leu Thr Val Cys Phe Val Lys Arg Asn Arg Gly Gly Lys Tyr Ser
1115 1120 1125

Val Lys Glu Lys Glu Asp Leu His Pro Asp Pro Glu Ile Gln Ser
1130 1135 1140

Val Lys Asp Glu Thr Phe Gly Glu Tyr Ser Asp Ser Asp Glu Lys
1145 1150 1155

Pro Leu Lys Gly Ser Leu Arg Ser Leu Asn Arg Asp Met Gln Pro
1160 1165 1170

Thr Glu Ser Ala Asp Ser Leu Val Glu Tyr Gly Glu Gly Asp His
1175 1180 1185

Gly Leu Phe Ser Glu Asp Gly Ser Phe Ile Gly Ala Tyr Ala Gly
1190 1195 1200

Ser Lys Glu Lys Gly Ser Val Glu Ser Asn Gly Ser Ser Thr Ala
1205 1210 1215

Thr Phe Pro Leu Arg Ala
1220

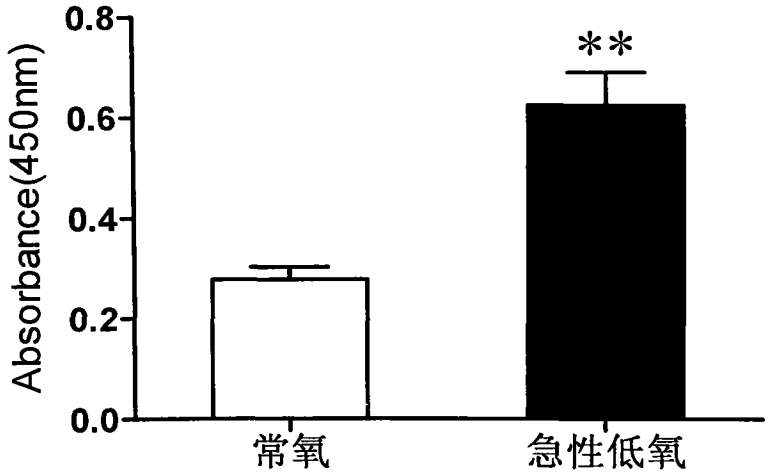
0.8
0.6
0.4
0.2
0.0
Absorbance(450nm)
**
常氧
急性低氧

图 1

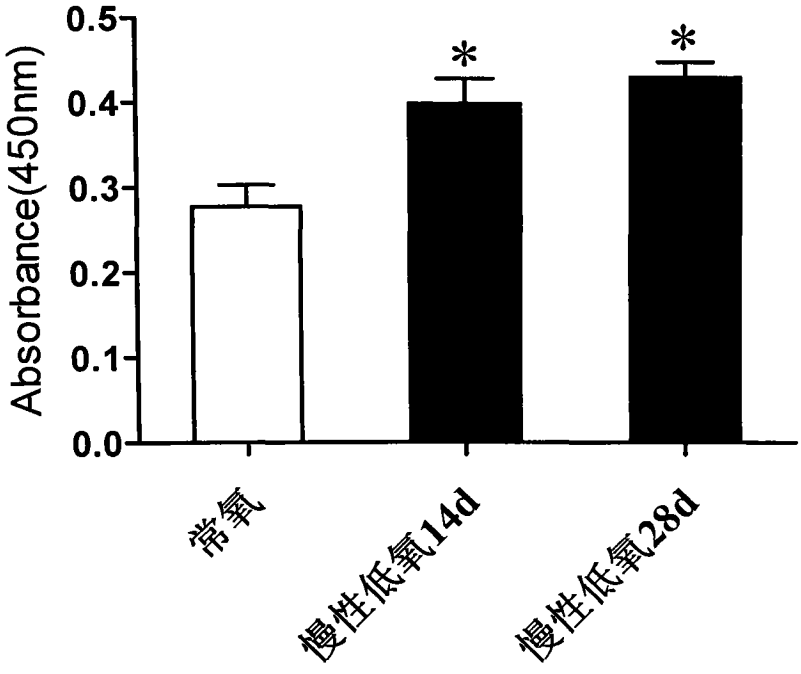
0.5
0.4
0.3
0.2
0.1
0.0
Absorbance(450nm)
*
*
常氧
慢性低氧14d
慢性低氧28d

图 2

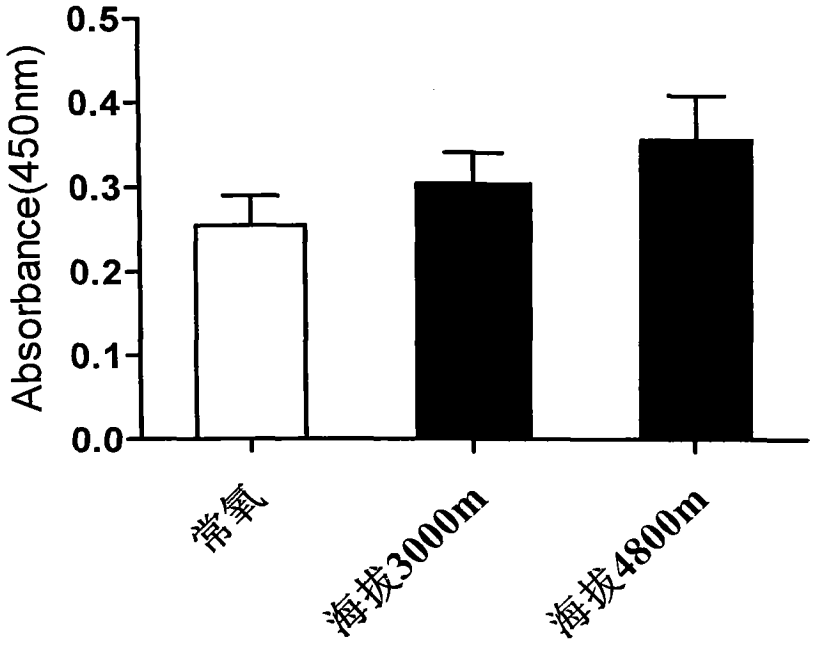

图 3

专利名称(译)	低氧标志分子CHL1及其应用		
公开(公告)号	CN103278624B	公开(公告)日	2016-03-30
申请号	CN201310138817.0	申请日	2013-04-22
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IPC分类号	G01N33/535		
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外部链接	Espacenet SIPO		

摘要(译)

本发明公开了属于生物医学材料技术领域的一种低氧标志分子CHL1及其应用。该标志分子为细胞粘附分子CHL1，其蛋白序列如SEQ？ID？No.1或SEQ？ID？No.2所示。本发明的CHL1可作为一种低氧标志分子，应用免疫学方法，利用该标志物分子制备的抗体和酶标二抗，利用酶联免疫学检测方法，可检测动物及人是否处于低氧状态，检测灵敏可靠。