The present invention relates to a composition comprising separated or proliferated cells from umbilical cord blood for treating developmental and/or chronic lung disease, more precisely a composition containing separated or proliferated cells from umbilical cord blood for intratracheal administration for treating developmental and/or chronic lung disease. The cells of the composition of the present invention have excellent activities of proliferation and differentiation, so that the extraction, separation and selection of a tissue donor are all very easy. Besides, the composition of the invention can be very effectively used for the treatment of developmental and/or chronic diseases by intratracheal administration.
Fig. 1a

NC: Normal Control

Fig. 1b

HC: Hyperoxia-exposed group
HT: Hypoxia-exposed and umbilical cord blood mesenchymal stem cell transplanting group

Fig. 1c

Fig. 2
COMPOSITION COMPRISING SEPARATED OR PROLIFERATED CELLS FROM UMBILICAL CORD BLOOD FOR TREATING DEVELOPMENTAL AND/OR CHRONIC LUNG DISEASE

TECHNICAL FIELD

[0001] The present invention relates to a composition comprising separated or proliferated cells from umbilical cord blood for treating developmental and/or chronic lung disease, more precisely a composition containing separated or proliferated cells from umbilical cord blood for intratracheal administration for treating developmental and/or chronic lung disease.

BACKGROUND ART

[0002] The developmental and/or chronic lung disease includes adult chronic obstructive lung disease (COPD) such as cystic fibrosis, emphysema, and bronchopulmonary dysplasia of infant or premature baby, etc. The seriousness of these diseases is that there is no specific treatment modality even though the severeness and chronicity of these diseases cannot be disregarded. The bronchopulmonary dysplasia is a chronic lung disease developed during the treatment of respiratory failure in a newborn infant or a premature baby. Recent progress of treating a premature baby increases the incidence of this untreatable disease (Avery M E et al., Pediatrics 79: 26-30, 1987). Not only this disease is regarded as a major cause of death of a newborn infant or a premature baby, but also among survivors, long-term hospitalization is required and serious side effects including pulmonary hypertension must be a worry. Even after discharge from hospital, re-hospitalization rate of bronchopulmonary dysplasia infants is usually more than 50% because they are more susceptible for acute viral bronchiolitis and pneumonia, and various infectious problems. It is also known that bronchopulmonary dysplasia might be progressed to bronchial asthma because of continuous bronchial hyper-sensitivity (Coalson J J. Semin Neonatol, 8:73-81, 2003) and associated with a serious long-term neurodevelopmental sequelae such as cerebral palsy (Bregman J and Farrell E E, Clin Perinatol, 19: 673-94, 1992).

[0003] An effective treatment method for bronchopulmonary dysplasia has not been developed, yet. It has been a major approach for the treatment of bronchopulmonary dysplasia to reduce barotrauma or volutrauma caused by positive pressure ventilation or reduce oxygen concentration during the artificial ventilation for a newborn- and a premature baby. In addition, steroid has been used to prevent and/or treat inflammation in the damaged lung. However, steroid treatment is now limited in relation to the recent reports that the use of steroid might be responsible for later abnormal neurodevelopmental prognosis, especially increase in cerebral palsy, etc (Committee on Fetus and Newborn, Pediatrics, 109: 330-8, 2002).

[0004] Recently an anticipation for the treatment using stem cells having a potential to be differentiated into every organs has been rising. However, the transplantation of embryonic stem cells which have excellent differentiation potential has serious technical and ethical problems, that is generation of uncontrollable teratoma, developmental problems caused by genomic imprinting, and questions of moral and ethics. Therefore, the application of embryonic stem cells seems to be limited and instead adult stem cells have been moved into the center of our interest.

[0005] Among adult stem cells, stem cells of hematopoietic system are a major target, stem cells of Hematopoietic system in bone marrow, which is their source, are generally grouped into two; hematopoietic stem cells and mesenchymal stem cells.

[0006] It has been already known that the hematopoietic stem cells in bone marrow have plasticity, suggesting that they are differentiated into not only hematopoietic system cells but also other organ cells (Gussoni E, Soneoka Y et al. Nature, 401:390-394, 1999; Petersen B E et al., Science, 284:1168-1170, 1999; Mezey E et al., Science. 290:1779-1782, 2000; Krause D S et al., Cell., 105:369-377, 2001), which is though not very common so that there is a doubt of biological usefulness, and some reports that was resulted from cell fusion, not from direct differentiation (Wagers A J et al., Science, 297:2256-2259, 2002).

[0007] Whereas, mesenchymal stem cells separated from bone marrow of an adult mouse, which were then named 'multipotent adult progenitor cell (MAPC)' are very capable of being differentiated into all three germ layers, ectoderm, mesoderm and endoderm, and in fact they were proved when the stem cells were injected into blastocyst of a mouse to be differentiated into almost every organ cells. These cells were reported to bear embryonic stem cell markers such as OCT-4, Rex 1 and SSEA-1 (Jiang Y et al., Nature. 418:41-49, 2002).

[0008] It is expected that the similar stem cells can be separated from human bone marrow to be applied to cell therapy for diseases and damages (Reyes M et al., Blood. 98:2615-2625, 2001; Woodbury D et al., J Neurosci Res, 61:364-370, 2000). However, hematopoietic stem cell and mesenchymal stem cell regions are reduced in bone marrow according to aging (Geiger H and Van Zant G. Nat Immunol., 3:329-333, 2002), and bone marrow extraction itself is distressing, which is disadvantage for actual clinical application. Thus, alternatives have been searched.

[0009] Umbilical cord is the line connecting a mother and a fetus through which nutrition is provided and wastes is excreted, and the blood inside is called umbilical cord blood. The umbilical cord blood seems to be the most appropriate alternative for bone marrow for hematopoietic stem cell extraction because it contains more primitive stem cells, compared with those in bone marrow, and cell extraction therefrom is much easier.

[0010] The transplantation of hematopoietic stem cells extracted from umbilical cord blood has been clinically applied since 1980s, based on such advantages, compared with bone marrow, as higher hematopoietic proliferation activity which means more hematopoietic stem cells per unit volume (Szilvassy S J et al., Blood. 98:2108-2115, 2001), less HLA incompatibility which means less graft versus host reactions (Rocha V et al., N Engl J Med., 342:1846-1854, 2000), simple and easy, and less invasive during extraction (Rubinstein P et al., N Engl J Med., 339:1565-1577, 1998) and remarkably lower risks of autologous marrow transplantation in case of various types of cancer or other diseases. In particular, umbilical cord blood bank has been opened recently, providing services of preservation and amplification of umbilical cord blood and their cells, which triggers the clinical practice for transplantation of hematopoietic stem cells of umbilical cord blood.
It is controversial whether mesenchymal stem cells particularly MAPC-like cells that have excellent differentiation potential into various organ cells reside in umbilical cord blood. If mass-production of such mesenchymal stem cells or MAPC-like cells is possible from umbilical cord blood, it would be an epoch-making discovery in cell therapy and cell & tissue regenerative medicine. It has been predicted based on the primitiveness of stem cells of umbilical cord blood that MAPC-like cells exist more in umbilical cord blood than in bone marrow. Recently mesenchymal stem cells were successfully separated from umbilical cord blood (Erics A et al., Br J Haematol., 109:235-242, 2000) and further proved to have MAPC cell-level multipotency enabling the differentiation into osteoblasts, lipocytes and nerve cells ex vivo (Lee O K et al., Blood, 103:1669-1675, 2004). At first, it was a common belief that the number of mesenchymal cells to be taken from umbilical cord blood was small and the proliferation of them was very difficult. But, according to recent reports, it has been proved that umbilical cord blood can provide huge number of mesenchymal stem cells and thereby ex vivo amplification of these cells is also possible.

It has been reported that these cells still possess multipotency after being amplified, and can be differentiated into osteoblasts, chondroblasts, lipocytes and nerve cells ex vivo, and nerve cells, cartilage and bone cells, hematopoietic cells and stem cells in vivo (Kogler G et al., J Exp Med., 200:123-135, 2004).

Methodologically, umbilical cord blood extracted from the real placental tissue can be most ideal source for autologous and homologous stem cells and these stem cells obtained thereby can be used directly or after amplifying stage whenever and as many as required.

However, there has been no attempt to apply umbilical cord blood derived stem cell transplantation to developmental and/or chronic lung disease. There are a few experimental reports that the adult bone marrow stem cells transplanted into a mouse with pneumonia induced by irradiation were differentiated into bronchial cells and type II pneumocyte (Theise N D et al. Exp Hematol., 30:1333-1338, 2002) and reduced bleomycin induced pulmonary fibrosis in adult animal models (Ortiz L et al. Proc Natl Acad Sci USA, 100:8407-8411, 2003).

There are some patents about disease treatment using the umbilical cord blood originated cells. For example, Korean Patent Publication No. 2003-0015160 describes a composition for the treatment of articular cartilage damage comprising cell components separated, proliferated and differentiated from umbilical cord blood and a medium containing thereof. And, Korean Patent Publication No. 2005-0105467 describes a method for treating myelodysplastic syndrome and myelosclerosis by the administration of umbilical cord blood-originated stem cells. However, there have been no descriptions on the therapeutic effect of umbilical cord blood-derived stem cell transplantation in developmental and/or chronic lung disease.

Thus, the present inventors established bronchopulmonary dysplasia model by administering high concentrated oxygen continuously, and then administered a composition of the invention into the airway. As a result, alveoli were increased in their numbers and developed normally. In conclusion, the present inventors completed this invention by confirming that the composition of the present invention can be effectively used for the treatment of developmental and/or chronic lung disease.

DISCLOSURE

[Technical Problem]

It is an object of the present invention to provide a composition comprising stem cells of umbilical cord blood for the treatment of developmental and/or chronic lung disease, for which no specific treatment method has been reported, yet.

[Technical Solution]

The present invention provides a composition for treating developmental and/or chronic lung disease comprising separated and proliferated cells from umbilical cord blood.

Umbilical cord blood, the origin of therapeutic cells of the invention, is defined as blood taken from umbilical vein connecting placenta and a fetus. Umbilical cord blood is a natural by-product of childbirth. The umbilical cord blood is much easier to obtain than general mesenchymal tissue like bone marrow requiring several steps of operation and it is also very easy to find a donor because umbilical cord blood deposit industry is developing steadily and infra has already been established. In addition, umbilical cord blood-originated cells are the one that does not express histocompatibility antigen HLA-DR (class II) which is the major cause of rejection after tissue- or organ transplantation. Thus, these cells can minimize the immune response according to transplantation, for example rejection against transplanted tissue or organ, suggesting that autologous or homologous umbilical cord blood transplantation is very useful and effective.

Extraction and separation of umbilical cord blood is as follows. In the case of normal vaginal delivery, right after childbirth, placenta is still in the womb and umbilical vein is expelled out. Thus, umbilical cord blood is extracted from the exposed umbilical vein. In the case of cesarian section, after placental separation from uterus umbilical cord blood is taken ex vivo from umbilical vein. According to the present invention, umbilical cord blood is extracted from the expelled umbilical vein right after childbirth by aseptic manipulation. At this time, umbilical cord blood can be taken either before or after placental separation from uterus. Particularly, from the secured umbilical vein, umbilical cord blood is taken into umbilical cord blood sampling bag containing anticoagulant by using a sampling needle.

A composition of the present invention contains one or more cells selected from a group consisting of monocytes such as autologous hematopoietic stem cells and mesenchymal stem cells derived from the umbilical cord blood, mesenchymal stem cells derived from the umbilical cord blood, and mesenchymal stem cells sub-cultured and amplified from the mesenchymal stem cells. The mesenchymal stem cells derived from the umbilical cord blood are multipotent, unlike the typicalstromal cells of bone marrow, suggesting that they are able to be differentiated into mesenchymal tissues such as bone, cartilage, adipose tissue, muscle, tendon, etc., under a proper condition. Umbilical cord blood derived mesenchymal stem cells have ability of self-renewal, suggesting that they are capable of proliferating under a proper condition, and might exhibit anti-inflam-
nervation activity when transplanted. Compared with those cells originated from mesenchymal stem cells derived from general mesenchymal tissues such as bone marrow, muscle and skin, these more primitive cells have far much excellent cell proliferation, and differentiation, and regulation substance secreting capacity.

[0023] To separate and culture mesenchymal stem cells derived from umbilical cord blood, any method described in previous literatures including Korean Patent Publication No. 2003-0069115 (Pittenger M F et al. Science, 284: 143-7, 1999; Lazarus H M et al. Bone Marrow Transplant. 16: 557-64, 1995) can be used and here is one example. The extracted umbilical cord blood is centrifuged to separate monocytes, which are then washed several times to eliminate impurities. The washed monocytes are cultured in a culture vessel with proper density, then the cells are proliferated with forming a single layer. Among these proliferating cells, those who are homogeneous and forming a colony with spindle shape, which can be observed by phase contrast microscopy, are mesenchymal stem cells. When these cells are proliferated, sub-cultures are performed until the cells are amplified enough.

[0024] For the cryopreservation of cells of the present invention, the conventional method well-known to those in the art can be used (Doyle et al., 1995), that is, a medium for the cryopreservation is composed of 10-20% FBS (fetal bovine serum), 10% DMSO (dimethylsulfoxide) and 5-10% glycerol and cells are suspended at the concentration of 1x10^6-5x10^6 cells per 1 Ml of medium.

[0025] The cell suspension is distributed into glass- or plastic ampoules for deep freezing, and then the ampoules are sealed and put in a deep freezer programmed to proper temperature. At this time, it is preferred to use a freeze-program allowing -1^o C./min of temperature change in order to reduce cell damage during thawing.

[0026] When the temperature of the ampoule reached ~180^o C., it is transferred into a liquid nitrogen tank. Cells can be stored therein for several years and their viability has to be checked at least every 5 years.

[0027] To thaw these cells, the ampoule has to be transferred from the liquid nitrogen tank into a 37^o C. water bath quickly. The thawed cells in the ampoule are placed in a culture vessel containing a medium supplemented with 10% FBS and 5% ES quickly under the aseptic condition.

[0028] According to the present invention, cell concentration is 1.0x10^6-1.0x10^7 cells/ml, and 1.0x10^5-1.0x10^6 cells/ml is more preferred and 1.0x10^5 cells/ml is most preferred. Composing of the present invention is preferably intratracheally-administered as close to lung tissues as possible, to increase therapeutic effect by improved accessibility, compared with the conventional cell transplantation using intravenous injection.

[0029] The present inventors centrifuged the extracted umbilical cord blood to separate monocytes, then the separated cells were cultured with a proper density in a culture vessel. When the cells were grown to proper density, subcultures were performed. The present inventors established a bronchopulmonary dysplasia model in neonatal rats by administering high-concentrated oxygen continuously from the birth. Bronchovascular lavage were obtained and the lungs were extracted from the animal model and stained. As a result, rats with bronchopulmonary dysplasia exhibited increased respiratory rate, poor weight gain, and chronic inflammatory reactions with monocytic infiltration and fibrosis with over-proliferated interstitial fibroblasts in the lung (see FIG. 1-FIG. 3). Besides, radial alveolar count (RAC) representing the number of alveoli was significantly decreased mean linear intercept (MLI) representing the size of alveoli was remarkably increased, and resultant the ratio of RAC to MLI, an alveolar development index, was significantly reduced, compared with that in the wild type normal rat.

[0030] The composition of the invention comprising cells labeled with red fluorescent PKH26 was intratracheally administered and then lung tissue of the rat was observed with a fluorescent microscope. As a result, the cells included in the composition of the invention safely located in the lung (see FIG. 5). Damage in the lung of the rat intratracheally administered with the composition of the invention (IT) was alleviated (see FIG. 1-FIG. 3) and the ratio of RAC to MLI was increased (see FIG. 4).

[0031] The composition of the present invention can additionally include a medium of cells separated or proliferated from umbilical cord blood. The medium was to suspend cells and any medium of general cell culture mediums, such as DMEM, MEM, alpha-MEM, McCoy’s 5A medium (Gibco), Eagle’s basal medium, CMRL medium, Glasgow minimum essential medium, Ham’s F-12 medium, Iscove’s modified Dulbeco’s medium, Liebovitz’ L-15 medium, RPMI 1640 medium, etc, can be used. Among these media, DMEM supplemented with 10% FBS is preferred.

[0032] The cell culture medium of the present invention can additionally include one or more subsidiary components, for example, fetal bovine serum, horse serum or human serum, antibiotics such as Penicillin G or streptomycin sulfate and anti-fungal agent such as amphotericin B, gentamycin or nystatin to prevent microorganism contamination.

[0033] The composition of the present invention includes the effective dosage enough to induce alveolar development by one time or several times administration. The composition can also be mixed with other stem cells for successful transplantation and other purposes. The composition can be used as not-frozen or can be frozen for the next use. To freeze the composition, a standard cryopreservative agent (ex: DMSO, glycerol, EpilifeTM or cell freezing medium (Cascade Biologies)) is added to the cells.

[0034] The cells separated and proliferated from unfrozen umbilical cord blood are carried by infusion bag (ex: a product Baxter, Becton-Dickinson, Medceo, National Hospital Products or Terumo).

[0035] The present invention further provides a method for treating developmental and/or chronic lung disease using a composition comprising separated or proliferated cells from umbilical cord blood.

[0036] The method of the present includes a step of administration to a patient. The administration route is direct engraftment or transplantation to the lesion of the lung or transplantation or injection into airway, but not always limited thereto. Both non-surgical administration using catheter and surgical administration such as injection or transplantation after thoracotomy are possible, but non-surgical administration using catheter is more preferred. Intravenous
injection, one of the conventional methods for transplantation of hematopoietic stem cells, can also be used.

DESCRIPTION OF DRAWINGS

[0037] The application of the preferred embodiments of the present invention is best understood with reference to the accompanying drawings, wherein:

[0038] FIG. 1-FIG. 3 are photographs illustrating that the pathological findings about lung tissues of neonatal rats induced with bronchopulmonary dysplasia, one of the developmental and/or chronic lung diseases, after treating with the method of the invention. FIG. 1 represents the normal control (NC), FIG. 2 represents the hypoxia-exposed group (HC), and FIG. 3 represents the hypoxia-exposed and umbilical cord blood mesenchymal stem cell transplanting group (HT).

[0039] FIG. 4 is a graph illustrating the alveolar development in the lung of a neonatal rat induced with bronchopulmonary dysplasia, one of the developmental and/or chronic lung disease, after treating with the method of the invention.

[0040] NC: normal control

[0041] HC: hypoxia-exposed group (bronchopulmonary dysplasia)

[0042] HT: hypoxia-exposed and umbilical cord blood mesenchymal stem cell transplanting group

[0043] *significant difference with NC group (p<0.05)

[0044] #significant difference with HC group (p<0.05)

[0045] FIG. 5 is a graph illustrating that the therapeutic cell component was safely located by the method of the invention in the lung of a neonatal rat induced with bronchopulmonary dysplasia.

[0046] Blue: nuclei stained with DAPI,

[0047] Red: labeled with PKH26

MODE FOR INVENTION

[0048] Practical and presently preferred embodiments of the present invention are illustrative as shown in the following Examples.

[0049] However, it will be appreciated that those skilled in the art, on consideration of this disclosure, may make modifications and improvements within the spirit and scope of the present invention.

EXAMPLE 1 Intratracheal Transplantation in Bronchopulmonary Dysplasia Model

[0050] The therapeutic cells of the invention were separated and cultured as follows. The extracted umbilical cord blood was centrifuged to separate monocytes. The separated cells were washed several times to eliminate impurities. The washed cells were cultured with a proper density in a culture vessel, observing the proliferation of mesenchymal stem cells with forming a monolayer. Then, when the cells were proliferated enough, sub-culture was performed until enough cell numbers were obtained (Yang S E et al., Cytotherapy, 6(5): 476-86, 2004).

[0051] The therapeutic cells of the invention were intratracheally transplanted in bronchopulmonary dysplasia model. To prepare the bronchopulmonary dysplasia model, high-concentrated oxygen was administered from right after birth and for 14 days into neonatal rats which were given birth by timed-pregnant Sprague-Dawley rats. To expose to hyperoxia, the rat was put in a 50 l acrylic box, in which humidity and temperature were controlled at 40-60% and 23-26°C, respectively under 1 a.p., then the box was saturated with 100% oxygen by 10 l/min for the first 10 minutes. When the oxygen saturation reached 95%, which was measured by oxygen analyzer, 100% oxygen was refixed by 2.5 l/min, during which the oxygen saturation was measured continuously to keep the oxygen saturation more than 95%. To avoid pulmonary edema caused by oxygen toxicity nursing rat dams were switched between room air and 95% oxygen every 24 hour.

[0052] Intratracheal administration of umbilical cord blood mesenchymal stem cells was performed using 26-gauge needle on the 5th day from birth by the concentration of 5.83x10^7 cells/0.05 ml after confirming air flow of trachea in the midline area of the neck.

[0053] On the 14th day, the rats were anesthetized by intraperitoneal ketamine injection. After fixing the lungs, thoracotomy was performed to expose the heart and the lung. Transectional perfusion with saline was done by introducing a 23-gage needle into the left ventricle, and followed by the right atrial paracentesis. A 24-gage catheter was inserted intratracheally, followed by tight clamp of the right main bronchi and excised cardiopulmonary tissues. 0.5 ml of saline was administrated by using 1 cc syringe through the inserted catheter and then bronchial-vascular lavage fluid was obtained by suction. 10% formalin was administrated in the left lung under the pressure of 12 cmH_2O through the inserted catheter, followed by extraction.

[0054] The lung tissue sections fixed with 10% formalin for 24 hours were embedded in paraffin, which were then cut by 5 um thick and stained with hematoxylin eosin, followed by observation under optical microscope. From the observation, the number of neutrophils, the level of fibrosis, the cell numbers and thickness of alveolar septa and pulmonary interstitium, and the presence or absence of pulmonary edema were investigated, and radial alveolar count (RAC) representing newly-formed saccules and alveoli and mean linear intercept (MLI) measuring the size of alveoli were measured and their ratio was determined.

[0055] To measure the RAC, a vertical line was drawn from terminal bronchiolo to the nearest fibrovascular septum, and the number of saccules between the terminal bronchiolo and the fibrovascular septum was counted under the optical microscope (×40). MLI was calculated using 1 mm ruler with counting the number of septum. Randomly selected different areas were observed under the microscope 10 times for each area and the resulting values were averaged for further statistic analysis.

[0056] Rats with bronchopulmonary dysplasia induced by hyperoxia-exposure showed increased respiratory rate and poor weight gain. The pathology of their lung showed chronic inflammatory reaction accompanied by the increase of monocytes such as alveolar macrophages and lymphocytes, and fibrosis accompanied by over-proliferation of interstitial fibroblasts (FIG. 1-FIG. 3).

[0057] The lung tissue of a bronchopulmonary dysplasia induced rats (HC), compared with that of normoxia control rats (NC) RAC, indicating the number of alveoli (Husain A N and Hassel R G Pediatric Pathol., 13:475-484, 1993), was significantly decreased, and MLI, indicating the size of alveoli (Dunnill M S., Thorax 1962;17:320-328), was
remarkably increased. As a result, the ratio of RAC to MLI, which is an index for alveolar development (Hussain A N et al., Hum Pathol., 29:710-717, 1998), was significantly decreased. The damage in pathology were significantly alleviated in the lung of the rats intratracheally administered with the therapeutic cell composition (HT) for the prevention and treatment of bronchopulmonary dysplasia (FIG. 1-FIG. 3), and their ratio of RAC to MLI was markedly increased (FIG. 4).

The composition of the invention comprising cells labeled with red fluorescent PKH26 was intratracheally administered and then lung tissue of the rat with bronchopulmonary dysplasia was observed with a fluorescent microscope. As a result, the cells included in the composition of the invention safely located in the lung (FIG. 5). Therefore, it has been confirmed that intra-tracheal transplantation of the therapeutic cells of the invention is very effective way to treat developmental and/or chronic lung disease.

INDUSTRIAL APPLICABILITY

The present invention provides a therapeutic composition comprising separated or proliferated cells from umbilical cord blood for treating developmental and/or chronic lung disease. According to the present invention, when the composition of the invention is administered directly into the airway, suggesting that the composition is administered near lung tissues, the therapeutic effect is increased owing to its accessibility. In addition, umbilical cord blood, a by-product of childbirth, can be obtained much easier than general mesenchymal tissue such as bone marrow, which requires several times of surgical operations. It is another advantage of using umbilical cord blood that deposit industry of umbilical cord blood has already been active, meaning infra is established and thereby donor is easily searched. Further the cells separated from umbilical cord blood do not express histocompatibility antigen II DR (Class II), which is the major cause of rejection after organ transplantation. Therefore, umbilical cord blood originated cells do not induce or minimize rejection, which is a huge barrier for transplantation. Not only autologous umbilical cord blood but also homologous umbilical cord blood can be used. The composition of the present invention, thus, can be effectively used for the treatment of developmental and/or chronic lung disease.

Those skilled in the art will appreciate that the conceptions and specific embodiments disclosed in the foregoing description may be readily utilized as a basis for modifying or designing other embodiments for carrying out the same purposes of the present invention. Those skilled in the art will also appreciate that such equivalent embodiments do not depart from the spirit and scope of the invention as set forth in the appended claims.

1. A composition for treating developmental and/or chronic lung disease comprising cells separated or proliferated from umbilical cord blood.

2. The composition for treating developmental and/or chronic lung disease according to claim 1, wherein the cells are one or more cells selected from a group consisting of monocytes, such as autologous hematopoietic stem cells, and mesenchymal stem cells separated from umbilical cord blood and mesenchymal stem cells sub-cultured and amplified from umbilical cord blood derived mesenchymal stem cells.

3. The composition for treating developmental and/or chronic lung disease according to claim 1, which additionally includes a medium for those separated and proliferated cells.

4. The composition for treating developmental and/or chronic lung disease according to claim 3, wherein the medium is selected from a group consisting of DMEM, MEM, alpha-MEM, McCoy's 5A medium (Gibco), Eagle's basal medium, CMRL medium, Glasgow minimum essential medium, Ham's F-12 medium, Iscove's modified Dulbecco's medium, Liebovitz' L-15 medium and RPMI 1640 medium.

5. The composition for treating developmental and/or chronic lung disease according to claim 1, wherein the composition is intratracheally administered to a patient.

6. The composition for treating developmental and/or chronic lung disease according to claim 1, wherein the chronic lung disease is selected from a group consisting of cystic fibrosis, chronic obstructive pulmonary disease or pulmonary dysplasia.

7. The composition for treating development and/or chronic lung disease according to claim 1, wherein the composition includes one or more subsidiary components selected from a group consisting of serum, antibiotics and anti fungal agents.

8. The composition for treating developmental and/or chronic lung disease according to claim 1, wherein the composition includes one or more subsidiary components selected from a group consisting of fetal bovine serum, horse serum, human serum, Penicillin G, streptomycin sulfate, amphotericin B, gentamycin and nystatin.