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(54) **METHOD FOR PREPARING SERUM AND SERUM PREPARATION APPARATUS**  
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JP 2006-014106 4/2006  
JP 3788479 6/2006  
KR 10-2006-0090453 A 11/2006  
WO WO-96/17871 6/1996  
WO WO-2004/103439 12/2004  
WO WO-2004/103440 12/2004  
WO WO 2005/065242 A2 7/2005  
WO WO 2005/105121 \* 11/2005  
WO WO 2006/054448 \* 5/2006

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**OTHER PUBLICATIONS**

McAlinden et al., "Comparison of Cancellous Bone-Derived Cell Proliferation in Autologous Human and Fetal Bovine Serum", Cell Transplantation 9 : 445-451 (2000).  
The Engineering Toolbox, "Sound Power, Intensity and Pressure", [http://www.engineeringtoolbox.com/sound-power-intensity-pressure-d\\_57.html](http://www.engineeringtoolbox.com/sound-power-intensity-pressure-d_57.html) 1 page accessed Aug. 22, 2012.\*  
Lovette et al., "The Subcellular Distribution and Partial Characterization of Cholinesterase Activities of Canine Platelets", Biochimica et Biophysica Acta 428: 355-368 (1976).  
Notice of Reasons for Rejection issued to CN Application No. 200880006822.3, mailed Jul. 1, 2011.  
Notice of Reasons for Rejection issued to KR Application No. 10-2009-7020759, mailed Mar. 8, 2011.  
N. Mizuno et al., "Human autologous serum obtained using a completely closed bag system as a substitute for foetal calf serum in human mesenchymal stem cell cultures", Cell Biology International, Academic Press, GB, vol. 30, No. 6, Jun. 1, 2006, pp. 521-524.  
J. Ito et al., "Increased content of epidermal growth factor in platelet lysates in non-insulin-dependent diabetes mellitus", Life Sciences, Pergamon Press, Oxford, GB, vol. 53, No. 9, Jan. 1, 1993, pp. 717-724.  
Hirai et al., "Review on concentration of cell growth factors in human serum prepared using a closed system human serum preparation device," Regenerative Medicine, Feb. 19, 2007, p. 306, p. 405, vol. 6.  
European Office Action for European Application No. 08 721 392.2 dated Mar. 28, 2013.  
Japanese Office Action for Japanese Application No. 2008-055554 with English translation dated Mar. 14, 2013.  
Moritz M W et al., "Factors influencing shear-induced platelet alterations: platelet lysis is independent of platelet aggregation and release", Thrombosis Research, Tarrytown, NY, US, vol. 22, No. 4, May 15, 1981, p. 445-455.

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None  
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\* cited by examiner

(56) **References Cited**  
U.S. PATENT DOCUMENTS  
5,100,564 A 3/1992 Pall et al.  
5,527,472 A 6/1996 Bellotti et al.  
6,214,338 B1 4/2001 Antanavich et al.  
7,678,780 B2 \* 3/2010 Mishra ..... 514/120  
2006/0039990 A1 2/2006 Barrueta et al.  
2006/0229547 A1 10/2006 Lynn et al.  
2006/0251622 A1 \* 11/2006 Suzuki et al. .... 424/93.2  
2009/0075355 A1 \* 3/2009 Suzuki et al. .... 435/183

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**FOREIGN PATENT DOCUMENTS**  
CN 1110867 A 10/1995  
EP 1 625 861 A1 2/2006  
JP H09 509432 A 9/1997  
JP 2000-228 1/2000  
JP 2003-55237 2/2003  
JP 2004-89495 3/2004

(57) **ABSTRACT**  
A method for preparing serum and a serum preparation apparatus is provided that can give a large amount of serum with high culture efficiency regardless of freshness of blood used. In a method for preparing serum from blood containing at least platelets, a platelet processing step is provided in which platelet membrane in the blood is destroyed. After the platelet processing step, a deposition step for depositing thermolabile protein in blood and a removal step for removing the thermolabile protein, which has been deposited in the deposition step, are preferably provided.

**2 Claims, 9 Drawing Sheets**