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= Technical Note =

Hemodialyzer : A Low Cost and High Efficiency Concentrator

Doh Ha KIM, Hwang Hee LEE*, Sung Kwang PARK, Sung Kyew KANG** and Haeng Soon PARK†**

Department of Pharmacy, College of Pharmacy, Chonnam National University, Kwangju, Korea 500-757.

**Department of Biological Engineering, Korea Advanced Institute of Science and Technology, Taejon, Korea 305-701*

***Department of Internal Medicine, Medical School, Chonbuk National University, Chonju, Korea 560-182.*

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저렴하고 효율적인 농축기로서의 혈액 투석기

김도하 · 이황희* · 박성광 · 강성귀** · 박행순†**

전남대학교 약학대학

*한국과학기술원 생명과학과

**전북대학교 의과대학

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Large volume of liquid samples in the laboratory can be concentrated with the aid of a hollow fiber dialyzer. The essential structural elements are 1) selectively permeable hollow fibers(membrane), 2) sample compartment, and 3) dialysate compartment encased by plastic framework or jacket as shown in *Fig.* 1.[1]

The same principle and design are also used to construct hemodialyzers in the hospital for the hemodialysis of renal patients provided with an appropriate dialysate. The number of fibers used in hemodialyzer varies with the effective surface area but generally range from 10,000 to 20,000, or more. Various hemodialyzer fibers reported are made of regenerated cellulose, modified cellulose, cellulose acetate, polycarbonate, polysulfone, etc. [2, 3, 4]

In this technical note, a domestic hemodialyzer is introduced as an excellent concentrator for the laboratory use by operating the unit without dialysate. Various factors of hemodialyzer are compared with hollow fiber dialyzers of two foreign brands (*Table* 1). The narrow internal diameter of hemodialyzer is not of any problem in the concentration of biological samples if used after a brief centrifugation to remove debris or large particles. When two or more hemodialyzers are connected in tandem array, the effective surface area will be doubled or more according to the number of units connected, the concentration efficiency will be increased thereby. The best part of hemodialyzer application for laboratory use is in its low cost, one tenths.

In *Fig.* 2, the system is set up for the concentration with two hemodialyzers in tandem array. As there is

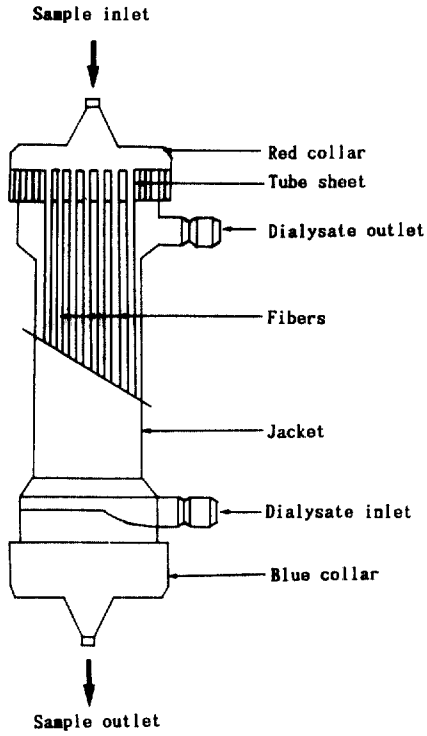

Fig 1. Structure of a typical hollow fiber dialyzer.

Table 1. Comparison of Hollow Fiber Dialyzer and Hemodialyzer

	Hollow Fiber Dialyzer		Hemodialyzer
Supplier	Amicon	Cole-Parmer	Green Cross, Korea
Effective surface area (m^2)	0.9	0.16	0.8
Fiber diameter (inside, mm)	0.5		0.2-0.3
Unit length (cm)	63.8	32	29.5
Molecular cutoffs (dalton)	3,000-	5,000-	5,000-
Unit/package	1	1	12/box
Package price ($)	*	*	316.80
Unit price ($)	*	*	26.40

* Consult the dealer or see the catalogue.

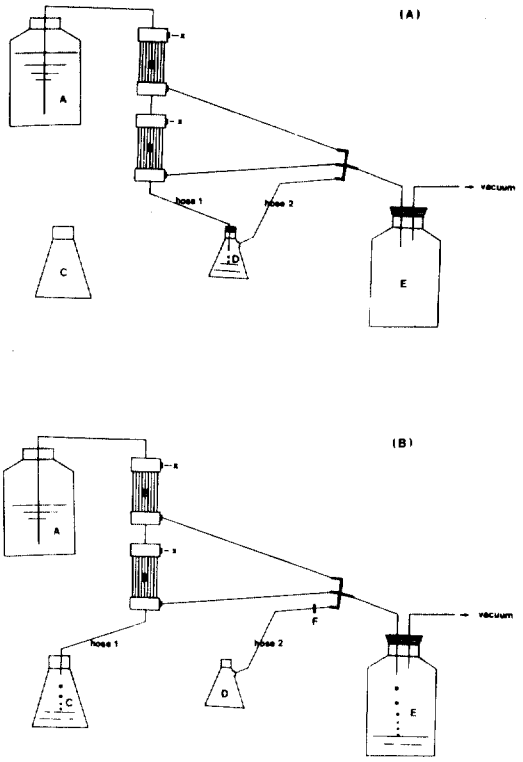

Fig 2. Concentration with two tandem-linked hemodialyzers.

(A) Set up for concentration; (B) Set up during concentration

A; Solution to be concentrated

B; Hemodialyzers in tandem array

C; Retentate collecting bottle

D; Vacuum flask

E; Filtrate collecting bottle, sealed

F; Clamp

no circulating dialysate in this concentration system, the dialysate inlets become filtrate outlets and the dialysate outlets of both hemodialyzers are kept closed. The units are set up as shown in *Fig.* 2(A) and vacuum is turned on. When the filtrate flows into D, clamp hose #2. The connections are changed as shown in *Fig.* 2(B) by moving hose #1 from D to C, and the retentate is collected into C while filtrate removed into E. The flow rate can be changed by placing a peristaltic pump or simply by adjusting the position of A.

We used this system to concentrate urine samples for

partial purification and characterization of urinary dipeptidase.[5] Hemodialyzer (GC−100M) was purchased from Green Cross Medical Corp., Young Dong, Seoul, Korea. Urine sample was pretreated by centrifugation at 25,000xg for 15 min. The concentration rate was adjusted approximately to 1.5−2 liter per hour. Fifty liters of urine could be concentrated into a few liters in 24 hours. The hemodialyzers should be washed with dilute sodium hydroxide solution, chlorine, or detergent and kept in the refrigerator filled with distilled water/0.02% sodium azide for long term storage.

The use of hemodialyzers is a very economical and efficient way to concentrate large volume of liquid samples.

Key Words : Hollow fiber dialyzer, Hemodialyzer

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