



# Sperm Bank: From Laboratory to Patient

Nam Cheol Park

President of the Korean Institute for Public Sperm Bank;  
Department of Urology, Pusan National University School of Medicine, Busan, Korea

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Currently human body banks are consisted of blood, tissue, milk as well as sperm by preserving body material. Of them, sperm banking is an important option to maintain the male fertilization capacity or induce pregnancy even though under the era of *in vitro* fertilization (IVF).

The 1st sperm bank established for therapeutic purpose of infertility at Iowa USA and Tokyo Japan on 1964, which was possible by tremendous scientific advancement like human sperm cryopreservation with glycerol on 1949 and 1st pregnancy with thawed freezing sperm on 1953 following to the effect of cryopreservation on human sperm on 1776. In USA, more than 1.0 million was born with provided sperm from commercial sperm bank during last 40 years history of sperm bank.

In Korea, we have long history of sperm bank activities with first trial of pregnancy with thawed freezing sperm on 1983 and first newborn with thawed freezing sperm on 1986 in Korea University, and following first sperm bank establishment on 1997. Nevertheless, 'Hwang Woo Suk Scandal' due to bioethical violation on 2004 caused to establish the law for human life ethics and safety on 2005, which is strictly regulating all of basic research and clinical activities in the field

of human reproduction until now. Therefore, we have permitted a seriously limited performance for assisted reproductive technologies as well as sperm bank operation. Additionally, Korea has the lowest population density of newborn among all Organization for Economic Cooperation and Development (OECD) countries with a total fertility rate of 1.17 and an annual birth rate of 300,000 level as of 2016 situation. To resolve these difficult situations in Korea, newly establishment of the Korea Institute for Public Sperm Bank on 2015, the Korean Network for Public Sperm Bank on 2016 and the Korea Institute for Standardizing Sperm Bank on 2017 would give us a chance to activate sperm bank operation up to global standard level.

The medical indications for sperm banking are generally consisted of 3 categories (Fig. 1). There are cases on planning the permanent contraception like pre-vasectomy status, cancer patients to be scheduled the chemotherapy or radiotherapy as well as high risk profession including veterinary use, police officers, firefighters, athletics as first category, male infertile patients with severe oligozoospermia or artificially harvested sperm *i.e.*, from microscopic epididymal sperm aspiration or testicular sperm extraction et cetera for the artificial insemination with husband sperm as sec-

**Correspondence to:** Nam Cheol Park <https://orcid.org/0000-0003-2735-9278>  
Department of Urology, Pusan National University School of Medicine, 179 Gudeok-ro, Seo-gu, Busan 49241, Korea.  
**Tel:** +82-51-240-7349, **Fax:** +82-51-247-5443, **E-mail:** [pnc@pusan.ac.kr](mailto:pnc@pusan.ac.kr)

ond category, and the therapeutic donor insemination as third category.

Of these three categories, the sperm donation program accompanies various complicated medical, ethical, legal, religious and cultural issues. Therefore, highly regulated statements are mandatory in order to secure safety and the complete practices for voluntary sperm donors and infertile couples both. Additionally, each country has different standard operation protocol, regulation statements, act and law to control the sperm banking program. Nevertheless, we need a consensus document to operate the sperm bank with the standard guidelines to be well established according to each country's ethical perspectives as well as contemporary scientific evolution. Actually, the regulations for sperm donation vary as per country; most of the countries have limit on the reimbursement for sperm donor, the number of donor offspring, the postmortem sperm har-

vest and prohibition on the sperm usage of a deceased donor.

Additionally, we still have some non-resolved debating issues, ie method for donor recruitment, identifying problem of donor information by offspring as a right to know their origin, huge demand for known donors, et cetera.

Sperm bank activities are classified by various parameters, which are directed donors, client donors, anonymous donors and known donors according to donor characteristics, semen analysis, sperm storage and genetic consultation according to offered clinical service, donor insemination and IVF according to fertilization technique. Of donor characteristics, directed donors is to store sperm for designated recipients, client donors is to store sperm to use with their partners, and known donor means non-anonymous which shows higher share as compared to anonymous owing to

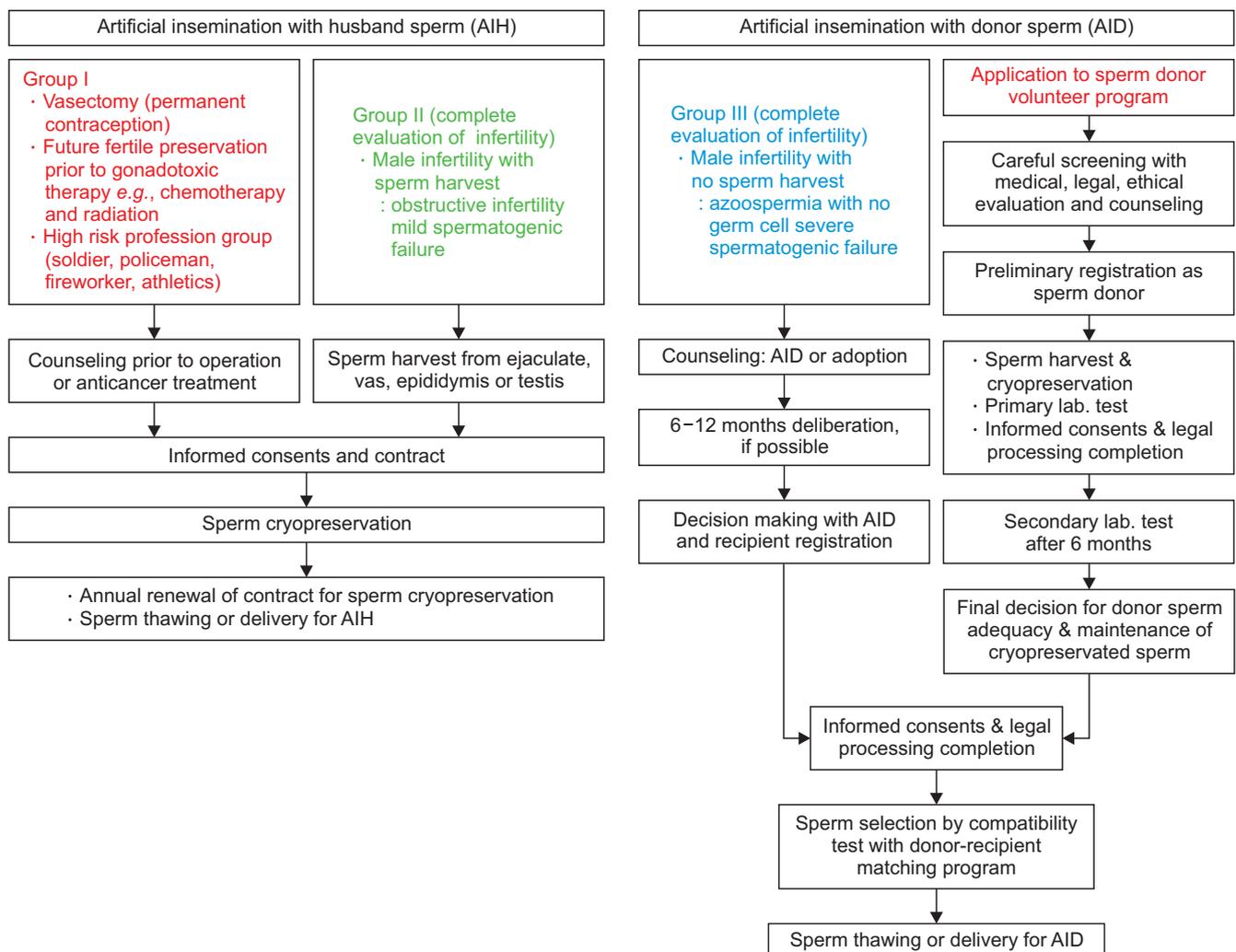


Fig. 1. Strategy for artificial insemination program with husband or donor sperm.

higher cost in sperm market or recipient preference. Under these circumstances, highly regulated statements are mandatory in order to secure safety and the complete practices for voluntary sperm donors and infertile couples both.

Recent our new organization will promote to set up the standard operation protocol, the national Information and Communication Technologies networking, national consensus inquiry survey of sperm bank as well as to amend the law and decree.

There are 3 types of sperm bank according to operation subject, administrative structure and budget source which are national, public, commercial and mixed. Even though 3 types of sperm bank are available in most western countries, there is mainly national based in the most of European countries like UK, France and China, mainly public based in Japan and Korea, and mainly commercial based in the USA and Denmark. Global sperm bank market is rapidly increasing in volume according to increasing prevalence of infertility, technological advancements pertaining to assistive reproduction technologies, fastest growing IVF segment due to the growing demand for IVF procedures and growing awareness regarding the benefits of IVF over insemination procedures, the presence of favorable government policies toward sperm donation and donor offspring in various countries with govern-

ment budget support, increasing number of countries legalizing same-sex marriage and rise of alternative conception opportunity for increasing aged population.

New report from Grand View Research, Inc. on 2017 anticipated the global sperm bank market to reach a value of nearly 5.0 billion USD with a compound annual growth rate of 3.5% by 2025. In 2015, North America held majority of the revenue share of the sperm bank market. The presence of large number of sperm banks and registered laboratories in North America is one of the key factors that can be accounted for the largest share. Europe is also the fastest growing segment owing to the disparity between high demand and low supply of sperm. Asia-Pacific market is also growing and will be expected the most prominent over forecasting 10 years especially with the announcement of one-child policy withdrawal on 2016 as the national population strategy.

Therefore we would like to provide what is the ideal model for sperm bank with prerequisite for the sperm bank operation, the expected effects and market evolution under rapid growing status of global market on sperm bank.

## **Disclosure**

The author has no potential conflicts of interest to disclose.