



Pluripotent Fetal Stem Cells in Treatment of the Vascular Factor of Erectile Dysfunction

Iaroslav Miroshnykov², Juza Chen², Mariya Klunnyk¹, Nataliia Sych¹, Andriy Sinelnyk¹, Khrystyna Sorochyńska¹, Sergey Kerus²

1: *Andrology Unit, †Clinical Department and ‡Stem Cell Bank, Cell Therapy Center EmCell, Kyiv, Ukraine;
2: Medical Centre “Institute of the family medicine plus”, Kiev, Ukraine



Introduction

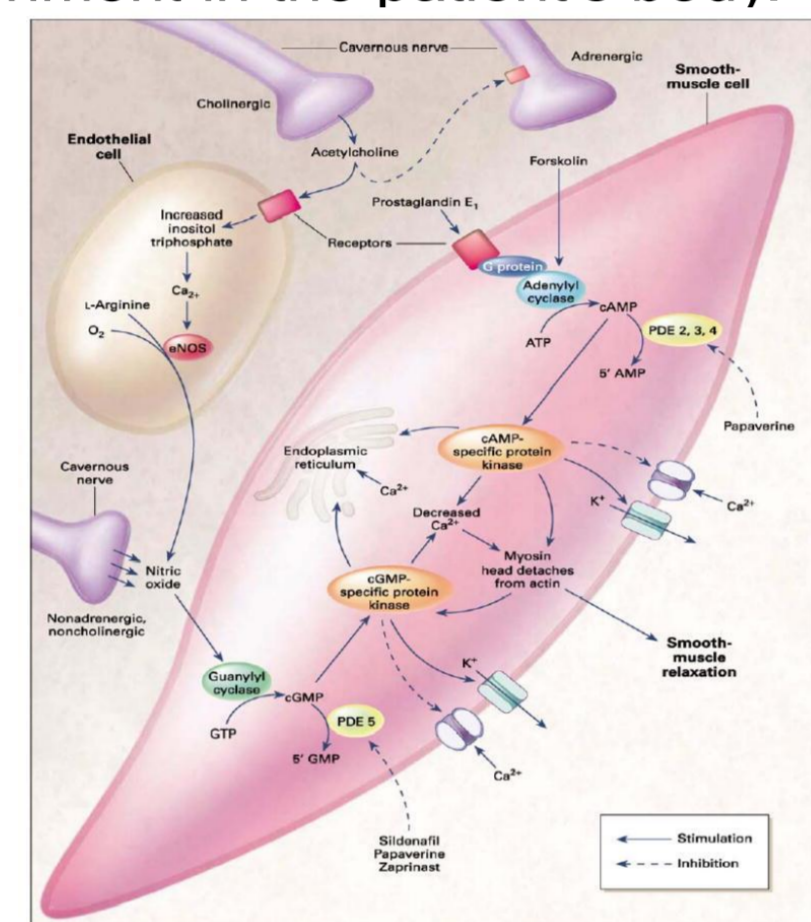
Existing treatment solutions of erectile dysfunction (ED) do not satisfy patients due to short-term and targeted effects.

To achieve prolonged and more pronounced treatment effects, we developed combined ED therapy with the use of 5 phosphodiesterase inhibitor vardenafil and fetal stem cell (FSC) suspensions.

We hypothesize that, in contrast to pharmaceuticals that work mainly at the functional level, fetal stem cells may contribute to **improvement in / replacement of erection structural**

components. This is possible due to their pluripotency – ability to develop into various cells under the signals from microenvironment in the patient's body.

While **pharmaceuticals work mainly at the functional level, FSC are likely to impact erection structural component**



Aim

The aim of our study was to investigate

impact of intracavernous fetal stem cell administration on erectile function and on erection vascular component.

Method

We examined 19 patients with mixed type of ED including vascular component. All the patients underwent complete examination of erection according to international standards. We used IIEF to assess erectile function and pharmacodopplerography with 10 mcg of PGE1 to measure cavernous blood flow.

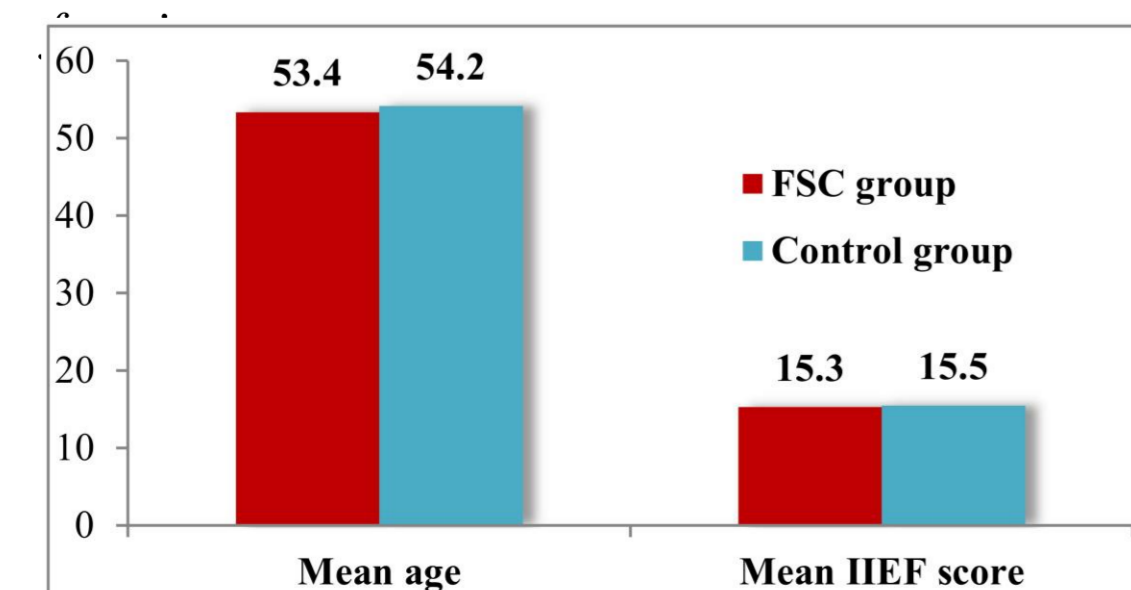
We divided patients into 2 groups:

- **Experimental, or FSC, group** that received pluripotent FSCs and vardenafil in a daily dose of 10 mg (n = 9),
- **Control group** (n = 10) that received vardenafil in a daily dose of 10 mg.

Both groups were statistically homogeneous with regard to age, erectile function, and penile circulation before treatment (Figure 1).

All the patients signed agreement for the treatment.

Figure 1. Studied groups were statistically homogeneous with regard to age and erectile



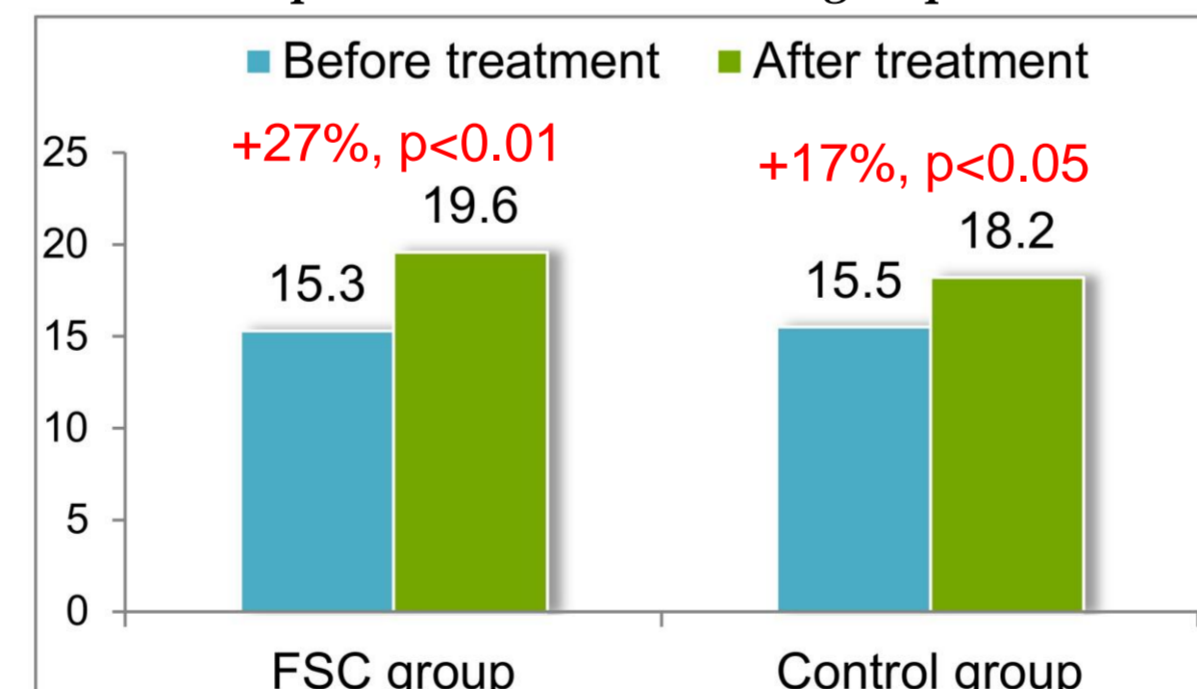
Each patient in the experimental group received **three types of fetal stem cell suspensions** derived from human fetuses following voluntary pregnancy terminations:

1. Containing fetal liver stem cells that were injected i/v and i/cavernously. I/c injection was performed during artificial erections induced by 10 mg of PgE1 which ensured temporary occlusion of cavernous bodies and created optimal condition for local application of fetal stem cells;
2. Containing fetal brain stem cells administered via pharmacopuncture;
3. Containing placenta stem cells administered subcutaneously.

Results

After treatment, erectile function score (by IIEF) increased 27% on average in the FSC group ($p < 0.01$) vs 17% in the control group ($p < 0.05$) (Figure 2).

Figure 2. Erectile function score improvement was more pronounced in the FSC group



The FSC group also demonstrated **two times higher increase in arterial inflow** vs the control group (20% and 10%, respectively) (Figure 3).

Venous component of cavernous circulation demonstrated the opposite dynamics in FSC and control groups. In FSC group, **venous outflow decreased 10%**, while in the control group it **increased 30%** on average (Figure 4).

Figure 3. Arterial inflow increase was two times higher in group that received FSCs

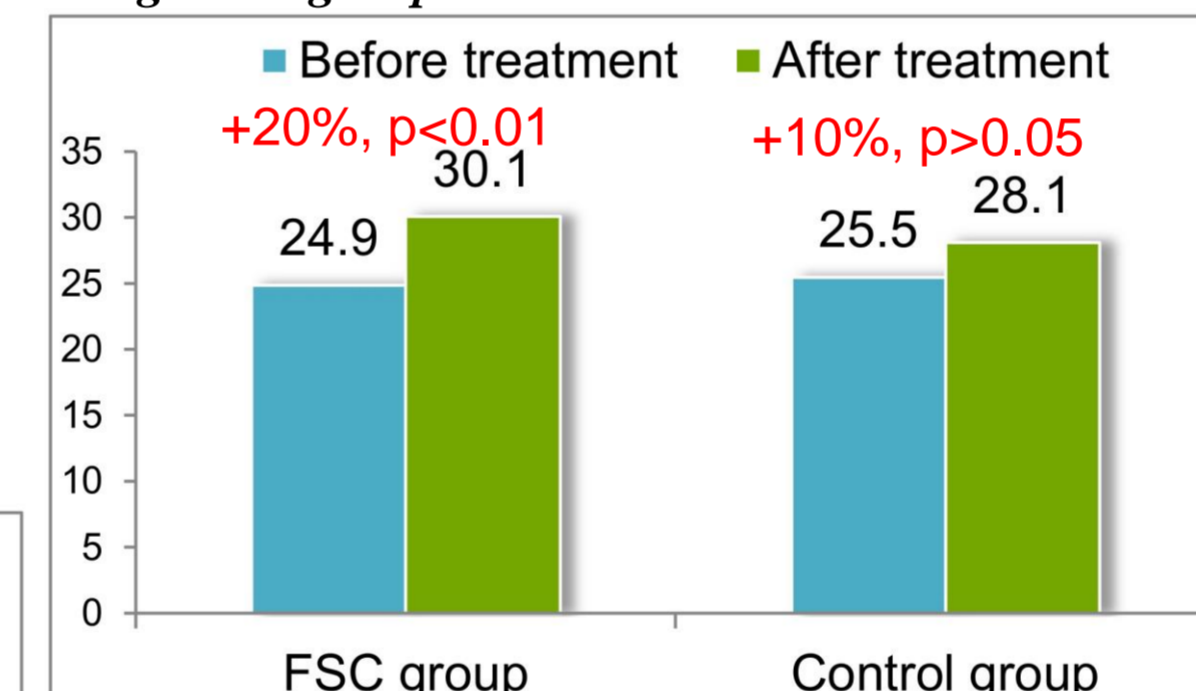
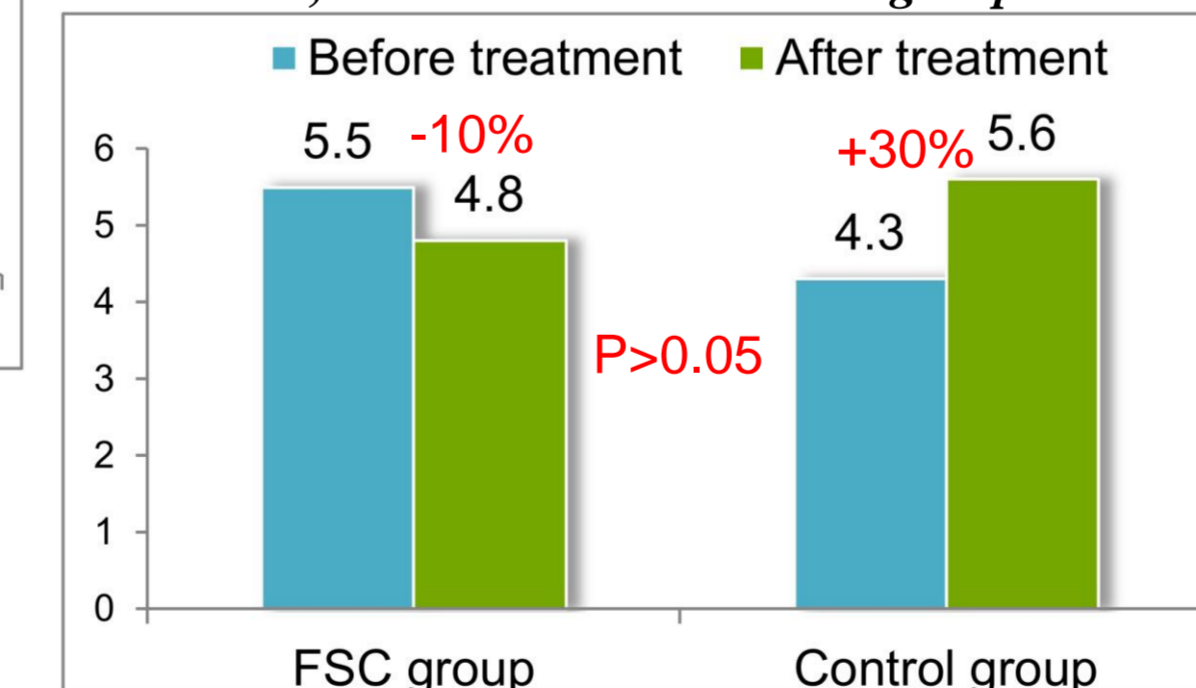


Figure 4. In the FSC group, venous outflow decreased, in contrast to the control group



Combined treatment including FSC also demonstrated **higher long-term efficacy** vs vardenafil monotherapy. 40% of patients in the FSC group reported maintenance of adequate erection without pharmacological stimulation 6 months after treatment, which was significantly higher than in the control group (25%) (Figure 5).

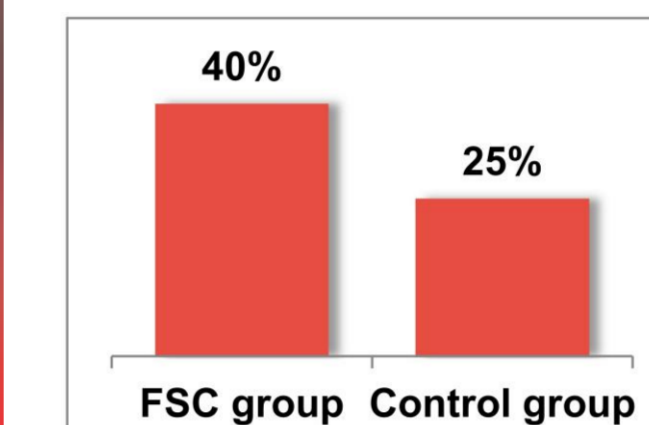


Figure 5. Share of patients who had medicine-free sexual life 6 months post-treatment

Such dynamics may be due to the following: while vardenafil works mainly on the endothelial biochemical (functional) level, stem cells regenerate erection structural components.

We believe that stem cells contribute to improvement in both active and passive components of erection via:

- **Increase in number of smooth muscle cells (passive);**
- **Angiogenesis leading to increase of blood inflow (passive);**
- **Stabilization of the physical properties of tunica albuginea (passive);**
- **Improvement in electrophysiological properties of the peripheral nervous structures (active);**
- **Modulation of testosterone metabolism (placenta stem cells).**

Summary

Combined treatment of ED comprising of vardenafil and cell suspensions containing pluripotent stem cells of fetal liver, brain and placenta had more pronounced positive effect on ED patients than vardenafil monotherapy, in particular:

1. Combined therapy including FSCs led to higher arterial inflow increase along with venous outflow decrease (compared to venous outflow growth in case of vardenafil monotherapy!). This resulted in **growing positive balance between arterial and venous components of erection in patients treated with FSCs.**
2. Erectile function score (IIEF) growth was higher in the FSC group (27%) than in the control group that received vardenafil only (17%).
3. The share of patients who had medicine-free sexual life 6 months post-treatment was higher in FSC group than in the control group (40% and 25%, respectively).

Conclusion

Combined therapy of ED comprising of FSC administration and vardenafil was more effective vs vardenafil monotherapy in terms of erection vascular component improvement, overall erectile function score increase and share of patients who had medicine-free sexual life 6 months post treatment.