higher in luteal phase in pigs, as in humans, but not in mice. Therefore, we suggest that the pig, rather than the mouse, would be a suitable model for studying the physiological role(s) of trophinin in the establishment of pregnancy in human.

Acknowledgements

We are grateful to Dr. M. N. Fukuda, the Burnham Institute (La Jolla, CA, USA), for providing the monoclonal antibody against human and mouse trophinin. This work was supported in part by a grant-in-aid for the Organized Research Combination System from the Ministry of Education, Culture, Sports, Science and Technology, Japan.

References

1. **Aplin JD, Seif MW, Graham RA, Hey NA, Behzad F, Campbell S.** The endometrial cell surface and implantation: Expression of the polymorphic mucin MUC-1 and adhesion molecules during the endometrial cycle. *Ann N Y Acad Sci* 1994; 734: 103–121.
2. **Argraves WS, Suzuki S, Arai H, Thompson K, Pierschbacher MD, Ruoslahti E.** Amino acid sequence of the human fibronectin receptor. *J Cell Biol* 1987; 105: 1183–1190.
3. **Bowen JA, Bazer FW, Burghardt RC.** Spatial and temporal analysis of integrin and Muc-1 expression in porcine uterine epithelium and trophectoderm in vivo. *Biol Reprod* 1996; 55: 1098–1106.
4. **Bowen JA, Hunt JS.** The role of integrins in reproduction. *Soc Exp Biol Med* 2000; 60: 331–343.
5. **Brenner RM, Slayden OD.** Cyclic changes in the primate oviduct and endometrium. In: Knobil E, Neill JD (eds.), The Physiology of Reproduction. 2nd ed, New York: Raven Press; 1994: 541–569.
6. **Cross JC, Werb Z, Fisher SJ.** Implantation and the placenta: key pieces of the development puzzle. *Science* 1994; 266: 1508–1518.
7. **Fukuda MN, Sato T, Nakayama J, Klier G, Mikami M, Aoki D, Nozawa S.** Trophinin and tastin, a novel cell adhesion molecule complex with potential involvement in embryo implantation. *Genes Dev* 1995; 9: 1199–1210.
8. **Henricks DM, Guthrie HD, Handlin DL.** Plasma estrogen, progesterone and luteinizing hormone levels during the estrous cycle in pigs. *Biol Reprod* 1972; 6: 210–218.
9. **Hynes RO.** Integrins: versatility modulation, and signaling in cell adhesion. *Cell* 1992; 69: 11–25.
10. **Kaeoket K, Persson E, Dalin AM.** The sow endometrium at different stages of the oestrous cycle: studies on morphological changes and infiltration by cells of the immune system. *Anim Reprod Sci* 2001; 65: 95–114.
11. **Kimura J, Obata T, Okada H.** Steroidal control mechanism of cell proliferation in mouse uterine epithelium. *Endocrin Jpn* 1978; 25: 7–12.
12. **Lessey BA.** Endometrial integrins and the establishment of uterine receptivity. *Hum Reprod* 1998; 13 (Suppl 3): 247–258.
13. **Lessey BA, Arnold JT.** Paracrine signaling in the endometrium: integrins and the establishment of uterine receptivity. *J Reprod Immunol* 1998; 39: 105–116.
14. **Lessey BA, Castelbaum AJ.** Integrins in the endometrium. *Reprod Med Rev* 1995; 4: 43–58.
15. **Lessey BA, Damjanovich L, Coutifaris C, Castelbaum AJ, Albelda SM, Buck CA.** Integrin adhesion molecules in the human endometrium. *J Clin Invest* 1992; 90: 188–195.
16. **Lessey BA, Ilesanmi AO, Lessey MA, Riben M, Harris JE, Chwalisz K.** Luminal and glandular endometrial epithelium express integrins differentially throughout the menstrual cycle: implications for implantation, contraception and infertility. *Am J Reprod Immunol* 1996; 35: 195–204.
17. **Magness RR, Ford SP.** Estrone, estradiol-17β and progesterone concentrations in uterine lymph and systemic blood throughout the porcine estrous cycle. *J Anim Sci* 1983; 57: 449–455.
18. **Nadano D, Sugihara K, Paria BC, Saburi S, Copeland NG, Gilbert DJ, Jenkins NA, Nakayama J, Fukuda MN.** Significant differences between mouse and human trophinins are revealed by their expression patterns and targeted disruption of mouse trophinin gene. *Biol Reprod* 2002; 66: 313–321.
19. **Nishida T, Murakami J, Otori T.** Expression of fibronectin receptor (integrin) in the uterus of rats in relation to the estrous cycle. *Histochemistry* 1991; 96: 279–283.
20. **Steel RGD, Torrie JH.** Principles and Procedures of Statistics. New York: McGraw-Hill; 1960: 107–109.
21. **Suzuki N, Nadano D, Paria BC, Kupriyanov S, Sugihara K, Fukuda MN.** Trophinin expression in the mouse uterus coincides with implantation and is hormonally regulated but not induced by implanting blastocysts. *Endocrinology* 2000; 141:

4247–4254.

22. **Suzuki N, Nakayama J, Shih IM, Aoki D, Nozawa S, Fukuda MN.** Expression of trophinin, tastin, bystin by trophoblast and endometrial cells in human placenta. *Biol Reprod* 1999; 60: 621–627.
23. **Tabibzadeh S.** Immunoreactivity of human endometrium: correlation with endometrial dating. *Fertil Steril* 1990; 54: 624–631.
24. **Tabibzadeh S.** Patterns of expression of integrin molecules in human endometrium throughout the menstrual cycle. *Hum Reprod* 1992; 7: 876–882.
25. **Tamkun JW, DeSimone DW, Fonda D, Patel RS, Buck C, Horwitz AF, Hynes RO.** Structure of integrin, a glycoprotein involved in the transmembrane linkage between fibronectin and actin. *Cell* 1986; 46: 271–282.
26. **Yelich JV, Pomp D, Geisert RD.** Ontogeny of elongation and gene expression in the early developing porcine conceptus. *Biol Reprod* 1997; 57: 1256–1265.
27. **Wang HY, Xing FQ, Chen SL.** Expression trophinin in the cycling endometrium and its association with infertility. *Di Yi Jun Yi Da Xue Xue Bao* 2002; 22: 539–541.