

この人間関係と総称される夫婦の絆・母子の絆・家族の絆・社会行動の精神神経内分泌基盤は視床下部の室傍核と視索上核のオキシトシン及びバソプレシン作動性神経細胞が主として担っていることが最近証明されてきた。それらの中枢を周生期及び乳幼児期に母乳育児を軸とする母子相互作用により機能を十分に育み鍛えることが総ての基礎である。その発達に障害の結果として家庭のみならず、近隣、学校、地域社会などに対する社会化(性)の発達が障害され、反社会的な心理行動異常など、連日マスコミを賑わしている種々の子ども心の問題を引き起こしていると解釈される。この子ども達の種々の行動が大人にとって異常として受け止められているが、これはまさに大人の社会病理を写し出す単なる鏡であることに為政者をはじめとする我々大人は気付くべきである。

中枢神経系の神経回路網の形成過程は遺伝的に決定されているが、その青写真は決して固定的ではなく、加えられる環境からの刺激により、如何ようにも構築されるという可塑性を有し極めて弾力性に富んだものである。換言すれば、神経回路網の配線、軸索と樹状突起の増殖、新しいシナプスの形成、神経回路網を構成している神経細胞のプログラムされた細胞死(アポトーシス)、中枢神経系の緻密な構築は遺伝的にプログラムされている。しかし、環境からの視覚、聴覚、味覚、嗅覚、触覚、痛覚という感覚刺激に対して生体内の恒常性を維持するように外界への応答が起こると同時に加えられた刺激が記憶(学習)として海馬などに蓄えられる。このように遺伝子は環境との相互作用、要するに、社会的関係、経験などにこの構築の仕組みを委ねている。この過程は子宮内で母の言葉を学び、出生により子宮外で独立した生活が開始されると共に加速される。生まれたばかりの哺乳動物の生存に必要な条件を満たすための神経内分泌機構は進化の過程で母親から児(仔)へ厳格に受け継がれ保存されている。さもなければその種は絶滅する運命を辿るのである。生殖行動、妊娠、分娩にまつわる基本的問題はすべての哺乳類に本質的に共通で、ヒトの脳が他の哺乳動

物に比べて複雑であるのは、ヒトの行動や心理が単にそれ以後の生物進化の産物として付加されたに過ぎないのである。従って、子の世話、哺乳、子の保護のような子の生存を支える過程にかかわる行動の制御は系統発生的に脳の古い部分であり、この部位はヒトと他の哺乳類との間で共通の基盤により行われていることを再確認することが求められる(Kjellmer & Winberg, 1994)。

## 結論

母子健康手帳に記載する育児情報の究極の目的はヒトが哺乳動物の一員であることを再認識して、母乳育児を基盤として母子相互作用を育み、夫婦の絆・母子の絆・家族の絆を強固に構築し、その上で、社会行動を発達させ、人類が嘗て経験した事のない厳しい少子高齢化社会に耐えて貢献できる人材を育成することにある。その基本となる精神神経内分泌機構においてオキシトシン・アルギニンバソプレシン・プロラクチンという神経ペプチドホルモンが中心的な役目を担いステロイドホルモンとの相互作用により、それに対応する受容体の視床下部を軸とする脳内の各領域における調和の取れた遺伝子発現にある。この神経回路網は視床下部下垂体副腎系の制御に関わり、しかも自律神経系とも密接な関係にある。要するに、生命現象の恒常性維持機構の根底に乳児期の母子間の基本的、絶対的信頼の構築がその後の人生における人間関係の基礎となっていると言っても過言ではないと考えられる。個々の事項の科学的根拠については上述したので省略した。

更に今後も研究を発展させこの領域の学問を追求し育児学の原理を究めたい。

## 研究発表

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## 主要引用・参考文献

- Aalinkeel R, Srinivasan M, Song F, Patel MS. Programming into adulthood of islet adaptations induced by early nutritional intervention in the rat. *Am J Physiol Endocrinol Metab* 2001; 281: E640-E648.
- Agostoni C, Granid F, Gianni ML, Silano M, Taarcoletti M, Giovannini M, Riva E. Growth patterns of breast fed and formula fed infants in the first 12 months of life: an Italian study. *Arch Dis Chil* 1999; 81: 395-399.
- 秋山泰子. 小児精神医学 I 精神療法. 新小児医学体系 14 A, 中山書店, 1985. pp. 159-166.
- Albers HE, Bamshad M. Role of vasopressin and oxytocin in the control of social behavior in Syrian hamsters (*Mesocricetus auratus*). *Prog Brain Res* 1998; 119: 395-408.
- Altman J. *Baboon Mothers and Infants*. Harvard University Press, Cambridge, 1980.
- Amico J, Johnston JM, Vagnucci AH. Suckling induced attenuation of plasma cortisol concentration in postpartum lactating women. *Endocrinol Res* 1994; 20: 79-87.
- Anand KJS, Scalzo FM. Can adverse neonatal experiences alter brain development and subsequent behavior? *Biol Neonate* 2000; 77: 69-82.
- 青野敏博. 産褥乳汁とプロラクチン. プロラクチン—その基礎と臨床. 倉知敬一編. 南山堂, 東京, 1984; pp. 126-139.
- 安藤寿康. 心はどのように遺伝するか. 双生児が語る新しい遺伝. ブルーボックス. 初版1刷, 講談社, 東京, 2000.
- Argiolas A, Gessa GL. Central functions of oxytocin. *Neurosci Biobehav Rev* 1991; 15: 217-231.
- Archer R. Chemistry of the neurohypophyseal hormones: an example of molecular evolution, in *Handbook of Physiology*, vol 4. Ed. Knobil E, Washington SW, DC, American Physiological Society, 1974, pp. 119-130.
- Arletti R, Benelli A, Bertolini. Influence of oxytocin on feeding behavior in the rat. *Peptides* 1989; 10: 89-93.
- Attele AS, Shi ZQ, Yuan CS. Leptin, gut, and food intake. *Biochem Pharmacol* 2002; 63: 1579-1583.
- Bakowska JC, Morrell JI. Atlas of the neurons that express mRNA for the long form of the prolactin receptor in the forebrain of the female rat. *J Comp Neurol* 1997; 386: 161-177.
- Bale TL, Pedersen CA, Doesa DM. CNS oxytocin receptor mRNA expression and regulation by gonadal steroids. *Adv Exp Med Biol* 1995; 395: 269.
- Bale TL, Davis AM, Auger AP, Dorsa DM, McCarthy MM. CNS region-specific oxytocin receptor expression: importance in regulation of anxiety and sex behavior. *J Neurosci* 2001; 21: 2546-2552.
- Bakwin H. Emotional deprivation in infants. *J Pediatr* 1949; 35: 512-521.
- Banks WA, Kastin AJ, Huang W, Jaspan JB, Maness LM. Leptin enters the brain by a saturable system independent of insulin. *Peptides* 1996; 17: 305-311.

- Barker DJP. Mothers Babies, and, and Disease in Later Life. 1994, British Medical Journal, London
- Barker DJP. Fetal origins of coronary heart disease. *Br Med J* 1995; 311: 171-174.
- Baron-Cohen S, Ring HA, Bullmore ET, Wheelwright S, Ashwin C, Williams SC. The amygdale theory of autism. *Neurosci Biobehav Rev* 2000; 24: 355-364.
- Barr CS, Newman TK, Shannon C, Parker C, Dvoskin RL, Becker ML, Schwandt M, Champoux M, Lesch KP, Goldman D, Suomi SJ, Higley JD. Rearing condition and rh5-HTTLPR interact to influence limbic-hypothalamic– pituitary-adrenal axis response to stress in infant macaques. *Biol Psychiatry* 2004; 55: 733-738.
- Bartels A, Zeki S. The neural basis of romantic love. *Neuroreport* 2000; 11: 3829-3834.
- Begley S. Your child's brain. *Newsweek*, Feb 19, 1996.
- Ben-Jonathan N, Arbogast LA, Hyde JF. Neuroendocrine regulation of prolactin release. *Prog Neurobiol* 1989; 33: 399-447.
- Bennis-Taleb N, Remacle C, Hoet JJ, Reusens B. A low-protein isocaloric diet during gestation affects brain development and alters permanently cerebral cortex blood vessels in rat offspring. *J Nutr* 1999; 129: 1613-1619.
- Bester-Meredith JK, Young LJ, Marler CA. Species differences in paternal behavior and aggression in *Peromyscus* and their associations with vasopressin immunoreactivity and receptors. *Horm Behav* 1999; 36: 25-38.
- Birch RA, Padmanabhan V, Foster DL, Unsworth WP, Robinson JE. Prenatal programming of reproductive neuroendocrine function: fetal androgen exposure produces progressive disruption of reproductive cycles in sheep. *Endocrinology* 2003; 144: 1426-1434.
- Bittigau P, Genz K, v Engekbrechten S, Hoerster F, Dikranian K, Olney JW, Ikonomidou C. Antiepileptics which enhance GABAergic inhibition cause neuronal apoptosis in the developing CNS. *Soc Neurosci Abstr* 2000; 26: 323.
- Blalock JE. A molecular basis for bidirectional communication between the immune and neuroendocrine systems. *Physiol Rev* 1989; 69: 1-32.
- Blaustein JD, Greco B. A progestin antagonist blocks vaginocervical stimulation-induced fos expression in neurones containing progestin receptors in the rostral medial preoptic area. *J Neuroendocrinol* 2002; 14: 109-115.
- Bluthe RM, Schoenen J, Dantzer R. Androgen-dependent vasopressinergic neurons are involved in social recognition in rats. *Brain Res* 1990; 519: 150-157.
- Bourre JM, Durand G, Pascal G, Youyou A. Brain cell and tissue recovery in rats made deficient in n-3 fatty acids by alteration of dietary fat. *J Nutr* 1989; 119: 15-22.
- Bourre JM, Francois M, Youyou A. The effects of dietary alpha-linolenic acid on the composition of nerve membranes, enzymatic activity, amplitude of electrophysiological parameters, resistance to poisons and performance of learning task in rats. *J Nutr* 119: 1880-1892, 1989.

- Bowlby J. *Maternal Care and Maternal Health*. WHO, Geneva, 1951. (二木 武 監訳. ポウルビィ. 母と子のアタッチメント心の安全基地. 医歯薬出版株式会社, 1993.)
- Bowlby J. *A Secure Base Clinical Applications of Attachment Theory*. Tavistock/Routledge London, 1988.
- Breiter HC, Gollub RL, Weisskoff RM, Kennedy DN, Makris N, Berke JD, Goodman JM, Kantor HL, et al. Acute effects of cocaine on human brain activity and emotion. *Neuron* 1997; 19: 591-611.
- Bridges RS, Human M, Ronsheim PM, Mann PE. Central prolactin infusions stimulate maternal behavior in steroid-treated, nulliparous female rats. *Proc Natl Acad Sci USA* 1990; 87: 8003-8007.
- Bridges RS, Mann PE. Prolactin-brain interactions in the induction of maternal behavior in rats. *Psychoendocrinology* 1994; 19: 611-622.
- Bridges RS, Byrnes EM. Neuroendocrine regulation of maternal behavior. In: Conn PM, Freeman ME eds: *Neuroendocrinology in Physiology and Medicine*, Human Press Totowa, New Jersey, Inc., 2000, pp.301-315.
- Brooke OG, Anderson HR, Bland JM, Peacock JL, Stewart CM. Effects on birth weight of smoking, alcohol, caffeine, socioeconomic factors, and psychosocial stress. *Br Med J* 1989; 298: 795- 801.
- Brooks PJ. The regulation of oxytocin mRNA levels in the medial preoptic area. *Ann N Y Acad Sci* 1992; 652: 271-285.
- Brown JR, Ye H, Bronson RT, Dikkes P, Greenberg ME. A defect in nurturing in mice lacking the immediate early gene *fosB*. *Cell* 86: 297-309, 1996.
- Budin P: *Le Nourisson*, Octave Doin, Paris 1900 (English translated by Maloney WJ : *The Nursling*. London, Caxton Publ. Co. 1907.
- Burbach JP, Luckman SM, Murphy D, Gainer H. Gene regulation in the magnocellular hypothalamo-neurohypophysial system. *Physiol Rev* 2001; 81: 1197-1267.
- Butler SR, Schanberg SM. Effect of maternal deprivation on polyamine metabolism in pre-weanling rat brain and heart. *Life Sci* 1977a; 21: 877-884.
- Butler SR, Suskind SM, Schanberg SM. Maternal behavior as a regulator of polyamine biosynthesis in brain and heart of the developing rat pup. *Science* 1977b; 199: 445-446.
- Byrnes EM, Rigero BA, Bridges RS. Opioid receptor antagonism during early lactation results in the increased duration of nursing bouts. *Physiol Behav* 2000; 70: 211-216.
- Cajal C, Ramon y (1852-1934). *Histologie du Systeme Nerveux de l'homme et des Vertebre*. Vol II, Malonie, Paries,
- Caldji C, Tannenbaum B, Sharma S, Francis, Plotsky PM, Meaney MJ. Maternal care during infancy regulates the development of neural systems mediating the the expression of behavioral fearfulness in adulthood in the rat. *Proc Natl Acad Sci USA* 1998; 95: 5335-5340.
- Caldji C, Diorio J, Meaney MJ. Variations in maternal care in infancy regulate the development of stress reactivity. *Biol Psychiatry* 2000; 48: 1164-1174.
- Caldwell JD, Prange AJ Jr, Pedersen CA. Oxytocin facilitates the sexual receptivity of estrogen-treated female rats. *Neuropeptides* 1986; 7: 175-189.

- Campbell GS, Argetsinger LS, Ihle JN, Kelly PA, Rillema JA, Carter-Su C. Activation of JAK2 tyrosine kinase by prolactin receptors in Nb2 cells and mouse mammary gland explants. *Proc Natl Acad Sci USA* 1994; 91: 5232-5236.
- Carbajal R, Veerapen CR, Couder S, Jugie M, Ville Y. Analgesic effect of breast-feeding in term neonates: Randomized controlled trial. *BMJ* 2003; 326: 13.
- Carlson M, Earls F. Psychological and neuroendocrinological sequelae of early social deprivation in institutionalized children in Romania. *Ann NY Acad Sci* 1997; 807: 419-428.
- Carmichael MS, Humbert R, Dixen J, Palmisano G, Greenleaf W, Davidson JM. Plasma oxytocin increases in the human sexual response. *J Clin Endocrinol Metab* 1987; 64:27-31.
- Carters B. *Child and Infant Pain. Principles of nursing care and management.* Staley Thomas, 1997.
- Carter CS. Oxytocin and sexual behavior. *Neurosci Biobehav Rev* 1992; 16: 131-144.
- Carter CS, Getz LL. Monogamy and the prairie vole. *Sci Am* 1993; 268:100-106.
- Carter CS, DeVries AC, Getz LL. Physiological substances of mammalian monogamy: the Prairie vole model. *Neurosci Biobehav Rev* 1995; 19: 303-314.
- Carter CS, Altemus M. Integrative functions of lactational hormones in social behavior and stress management. *Ann NY Acad Sci* 1997; 807: 164-174.
- Casabiell X, Pineiro V, Tome MA, Peino R, Dieguez C, Casanueva FF. Presence of leptin in colostrum and/or breast milk from lactating mothers: a potential role in the regulation of neonatal food intake. *J Clin Endocrinol Metab* 1997; 82: 4270-4273.
- Casey BJ, de Haan M. Introduction: new methods in developmental science. *Developmental Sci* 2002; 5: 265-396.
- Champagne F, Diorio J, Sharma S, Meaney MJ. Naturally occurring variations in maternal behavior in the rat are associated with differences in estrogen-inducible central oxytocin receptors. *Proc Natl Acad Sci USA* 2001; 98: 12736-12741.
- Charpak N, Ruiz JG, de Calume ZF. Humanizing neonatal care. *Acta Paediatr* 2000; 89: 501-502.
- Chuah MI, Zheng DR. Olfactory marker protein is present in olfactory receptor cells of human fetuses. *Neuroscience* 1987; 23: 363-370.
- Chugani H, Phelps ME, Mazziotta JC. Positron emission tomography study of human brain functional development. *Ann Neurol* 1987; 22: 487-497.
- Cinaz P, Sen E, Bideci A, Ezgu FS, Atalay Y, Koca E. Plasma leptin levels of large for gestational age and small for gestational age infants. *Acta Paediatr* 1999; 88: 753-756.
- Clancy B, Darlington RB, Finlay BL. The course of human events: predicting the timing of primate neural development. *Devel Sci* 2000; 3: 57-66.
- Clandinin MT, Cheema S, Field CJ, Garg ML, Venkatraman J, Clandinin TR. Dietary fat: exogenous determination of membrane structure and cell function. *FASEB J* 1991; 5: 2761-2769.
- Clarren SK, Alvord EC Jr, Sumi SM, Streissguth AP, Smith DW. Brain malformations related to prenatal

- exposure to ethanol. *J Pediatr* 1978; 92: 64-67.
- Clement K, Ferre P. Genetics and the pathophysiology of obesity. *Pediatr Res* 2003; 53: 721-725.
- Cockburn F. Role of infant dietary long-chain polyunsaturated fatty acids, liposoluble vitamins, cholesterol and lecithin on psychomotor development. *Acta Paediatr Suppl* 2003; 442: 19-33.
- Cohn J, Gerall AA. Pre- and postpuberal medial preoptic area lesions and maternal behavior in the rat. *Physiol Behav* 1989; 46: 333-33.
- Colbert ED, Morales M. Evolution of the Vertebra. Fourth Edition. (田隅本生監訳. 築地書館、1994.12.20.)
- Colombo JP, Garcia-Rodenas C, Guesry PR, Rey J. Potential effects of supplementation with amino acids, choline or sialic acid on cognitive development in young infants. *Acta Paediatr Suppl* 2003; 92: 42-46.
- Convey EM, Reece RP. Restoration of pituitary lactogen released in response to suckling. *Proc Soc Exp Biol Med* 1969; 131: 543-546.
- Comblath M. Neonatal hypoglycemia 30 years later: does it injure the brain? Historical summary and present challenges. *Acta Paediatr Jpn* 1997; 39: S7.
- Cornelius MD, Leech SL, Goldschmidt L, Day NL. Prenatal tobacco exposure: is it a risk factor for early tobacco experimentation? *Nicotine Tob Res* 2000; 2: 45-52.
- Costa LG, Steardo L, Cuomo V. Structural effects and neurofunctional sequelae of developmental exposure to psychotherapeutic drugs: experimental and clinical aspects. *Pharmacol Rev* 2004; 56: 103-147.
- Csibra G, Tucker LA, Johnson MH. Differential frontal cortex activation before anticipatory and reactive saccades in infants. *INFANCY* 2001; 2: 159-174.
- Dantzer R, Koob GF, Bluthé R-M, Moal ML. Septal vasopressin modulates social memory in male rats. *Brain Res* 1988; 457: 143-147.
- Dantzer R. Vasopressin, gonadal steroids and social recognition. *Prog Brain Res* 1998; 119: 409-414.
- Davidson EH, McClay DR, Hood L. Regulatory gene networks and the properties of the developmental process. *Proc Natl Acad Sci USA* 2003; 100: 1475-1480.
- Davies J, Waller S, Zeng Q, Wells S, Murphy D. Further delineation of the sequences required for the expression and physiological regulation of the vasopressin gene in transgenic rat hypothalamic magnocellular neurones. *J Neuroendocrinol* 2003; 15: 42-50.
- Davis PJ, Partridge JW, Storrs CN. Alcohol consumption in pregnancy. How much is safe? *Arch Dis Child* 1982; 57: 940-943.
- de Chateau P, Wiberg B. Long-term effect on mother-infant behaviour of extra contact during the first hour post partum. I. First observations at 36 hours. *Acta Paediatr Scand* 1977; 66: 137-143.
- Decsi T, Koletzko B. Polyunsaturated fatty acids in infant nutrition. *Acta Paediatr Suppl* 1994; 83: 31-37.
- de Haan M, Pascalis O, Johnson MH. Specialization of neural mechanisms underlying face recognition in human infants. *J Cogn Neurosci* 2002; 14: 199-209.
- Demarest KT, Moor KE, Rigle GD. Acute restraint stress decreases tuberoinfundibular dopaminergic neuronal

- activity: Evidence for a differential response in male versus female rats. *Neuroendocrinology* 1985; 41: 504-510.
- Denenberg VH. Critical period, stimulus input, and emotional reactivity: a theory of infantile stimulation. *Psychol Rev* 1964; 71: 335-351.
- Denenberg VH, Rosenberg KM. Nongenetic transmission of information. *Nature* 1967; 216: 549.
- Dessens AB, Cohen-Kettenis PT, Mellenbergh GJ, Koppe JG, van De Poll NE, Boer K. Association of prenatal phenobarbital and phenytoin exposure with small head size at birth and with learning problems. *Acta Paediatr* 2000; 89: 533-541.
- De Wied D. The influence of the posterior and intermediate lobe of the pituitary and pituitary peptide on the maintenance of a conditioned avoidance response in rats. *Int J Neuropharmacol* 1965; 4: 157-167.
- de Wied D, Diamant M, Fodor M. Central nervous system effects of the neurohypophyseal hormones and related peptides. *Front Neuroendocrinol* 1993; 14: 251-302.
- Doppler W. Regulation of gene expression by prolactin. *Rev Physiol Biochem Pharmacol* 1994; 124: 93-130.
- Doren A. *Monumenta Germaniae*. Bd. I. Die Geschichtsschreiber der deutschen Vorzeit, zweite Gesamtausgabe, Bd. 1914; 93, S. 359, Leipzig.
- Dvorak B, Fituch CC, Williams CS, Hurst NM, Schanler RJ. Increased epidermal growth factor levels in human milk of mothers with extremely premature infants. *Pediatr Res* 2003; 54: 15-19.
- Eaton SB, Konner M. Paleolithic nutrition. Consideration of its nature and current implication. *New Engl J Med* 1985; 312: 283-289.
- Edward DP, Kaufman LM. Anatomy, development, and physiology of the visual system. *Pediatr Clin North Am* 2003; 50: 1-23.
- Eiseberg L. In *Mammalian Parenting: Biochemical, Neurobiological, and Behavioral Determinants*, Krasnegor NA, Bridges RS, eds, Oxford Univ Press, New York, 1990.
- Eiseberg L. Social psychiatry and the human genome: contextualizing heritability. *Brit J Psychiatry* 2004; 184: 101-103.
- Emery JL. Parents and children in art. *Acta Paediatr Suppl* 394: 40-46, 1994.
- Emmett SW. *Thory and treatment of anorexia nervosa and bulimia*. New York, Brunner. Mazel publishers, 1985.
- Engelmann M, Landgraft R. Microdialysis administration of vasopressin into the septum improves social recognition in Brattleboro rats. *Physiol Behav* 1994; 55:145-149.
- Eriksson M, Linden A, Uvnaes-Moberg K. Suckling increases insulin and glucagon levels in peripheral venous blood of lactating dogs. *Acta Physiol Scand* 1987; 131: 391-396.
- Eriksson M, Bjoerkstrand E, Smedh U, Alster P, Matthiesen AS, Uvn aes-Moberg K. Role of vagal nerve activity during suckling. Effects on plasma levels of oxytocin, prolactin, VIP, somatostatin, insulin, glucagon, glucose and of milk secretion in lactating rats. *Acta Physiol Scand* 1994; 151: 453-459.
- Eriksson M, Lindh B, Uvnaes-Moberg K, Hoekfelt T. Distribution and origin of peptide-containing nerve fibers

- in the rat and human mammary gland. *Neuroscience* 1996; 70: 227-245.
- Eriksson M, Bjoerkstrand E, Smedh U, Alster P, Matthiesen AS, Uvn aes-Moberg K. Role of vagal nerve activity during suckling. Effects on plasma levels of oxytocin, prolactin, VIP, somatostatin, insulin, glucagon, glucose and of milk secretion in lactating rats. *Acta Physiol Scand* 1994; 151: 453-459.
- Fahrbach SE, Morrell JI, and Pfaff DW. Possible role of endogenous oxytocin in estrogen-facilitated maternal behavior in rats. *Neuroendocrinology* 1985; 40: 526-532.
- Ferguson JN, Young LJ, Hearn EF, Matzuk MM, Insel TR, Winslow JT. Social amnesia in mice lacking the oxytocin gene. *Nat Genet* 2000; 25: 284-288.
- Ferguson JN, Aldag JM, Insel TR, Young LJ. Oxytocin in the medial amygdala is essential for social recognition in the mouse. *J Neurosci* 2001; 21: 8278-8285.
- Ferguson JN, Young LJ, Insel TR. The neuroendocrine basis of social recognition. *Front Neuroendocrinol* 2002; 23: 200-224.
- Field T: Maternal depression effects on infants and early interventions. *Prev Med* 1998; 27: 200-203.
- Fisher DA, Klein AH. Thyroid development and disorders of thyroid function in the newborn. *N Engl J Med* 1981; 304 : 702-712.
- Fleming AS. Factors influencing maternal responsiveness in humans: usefulness of an animal model. *Psychoneuroendocrinology* 1988; 13: 189-212.
- Francis D, Diorio J, Liu D, Meaney MJ. Nongenomic transmission across generations of maternal behavior and stress responses in the rat. *Science* 1999; 286: 1155-1158.
- Francis DD, Champagne FC, Meaney MJ. Variations in maternal behaviour are associated with differences in oxytocin receptor levels in the rat. *J Neuroendocrinol* 2000; 12: 1145-1148.
- Francis DD, Young LJ, Meaney MJ, Insel TR. Naturally occurring differences in maternal care are associated with the expression of oxytocin and vasopressin (V1a) receptors: gender differences. *J Neuroendocrinol* 2002; 14: 349-353.
- Freeman ME, Kanyicska B, Lerant A, Nagy G. Prolactin: structure, function, and regulation of secretion. *Physiol Rev* 2000; 80:1523-1631.
- Fujikawa T, Soya H, Yoshizato H, Sakaguchi K, Doh-Ura K, Tanaka M, Nakashima K. Restraint stress enhances the gene expression of prolactin receptor long form at the choroid plexus. *Endocrinology* 1995; 136: 5608-5613.
- Gainer H, Wray S. Cellular and molecular biology of oxytocin and vasopressin. *The Physiology of Reproduction*, 1994, pp.1099-1129.
- Gala RR. The physiology and mechanisms of the stress-induced changes in prolactin secretion in the rat. *Life Sci* 1990; 46: 1407-1420.
- Gale CR, Martyn CN. Breastfeeding, dummy use, and adult intelligence. *Lancet* 1996; 347: 1072-1075.
- Gammie SC, Nelson RJ. Maternal aggression is reduced in neuronal nitric oxide synthase-deficient mice. *J Neurosci* 1999; 19: 8027-8035.



- Gammie SC, Huang PL, Nelson RJ. Maternal aggression in endothelial nitric oxide synthase-deficient mice. *Horm Behav* 2000; 38: 13-20.
- Gentz J, Kellum M, Persson B. The effect of feeding on oxygen consumption, RQ and plasma levels of glucose, FFA, and D- $\alpha$ -hydroxybutyrate in newborn infants of diabetic mothers and small for gestational age infants. *Acta Paediatr Scand* 1976; 65: 445-454.
- Getz LL, Carter CS, Gavish L. The mating system of the prairie vole *Microtus ochrogaster*: field and laboratory evidence for pair bonding. *Behavioral Ecology and Sociobiology* 1981; 8: 189-194.
- Getz LL, Hofman JE. Social organization in free living prairie voles, *Microtus ochrogaster*. *Behavioral Ecology and Sociobiology* 1986; 18: 275-282.
- Getz LL, McGuire B, Pizzuto T, Hoffman J, Frase B. Social organization of the prairie vole (*Microtus ochrogaster*). *J Mammalogy* 1993; 74: 44-58.
- Gibbs DM. High concentration of oxytocin in hypophyseal portal plasma. *Endocrinology* 1984; 114: 1216-1218.
- Gibson R, Neumann M, Makrides M. Effect of increasing breast milk docosahexaenoic acid on plasma and erythrocyte phospholipid fatty acids and neural indices of exclusively breast fed infants. *Eur J Clin Nutr* 1997; 51: 578-584.
- Gillman MW, Rifas-Shiman SL, Camargo CA Jr, Berkey CS, Frazier AL, Rockett HR, Field AE, Colditz GA. Risk of overweight among adolescents who were breastfed as infants. *JAMA* 2001; 285: 2461-2467.
- Gillman MW. Breast-feeding and obesity. *J Pediatr* 2002; 141: 749-750.
- Gimpl G, Fahrenholz F. The oxytocin receptor system: structure, function, and regulation. *Physiol Rev* 2001; 81: 629-683.
- Glied S. Is smoking delayed smoking averted? *Am J Public Health* 2003; 93: 412-416.
- Godfrey KM, Barker DJ. Fetal nutrition and adult disease. *Am J Clin Nutr* 2000; 71: 1344S-1352S.
- Gonnella PA, Harmatz P, Walker WA. Prolactin is transported across the epithelium of the jejunum and ileum of the suckling rat. *J Cell Physiol* 1989; 40: 138-149.
- Gonzalez A, Fleming AS. Artificial rearing causes changes in maternal behavior and c-fos expression in juvenile female rats. *Behav Neurosci* 2002; 116: 999-1013.
- Gottesfeld Z, Abel EL. Maternal and paternal alcohol use: effects on the immune system of the offspring. *Life Sci* 1991; 48:1-8.
- Grattan DR. Behavioural significance of prolactin signalling in the central nervous system during pregnancy and lactation. *Reproduction* 2002; 123: 497-506.
- Gray P, Brooks PJ. Effect of lesion within the medial preoptic-anterior hypothalamic continuum on maternal and male sexual behavior in female rats. *Behav Neurosci* 1984; 98: 703-711.
- Grazzini E, Guillon G, Mouillac B, Zingg HH. Inhibition of oxytocin receptor function by direct binding of progesterone. *Nature* 1998; 392: 509-512.
- Grisaru-Granovsky S, Eitan R, Algur N, Schimmel MS, Diamant YZ, Samueloff A. Maternal and umbilical

- cord serum leptin concentrations in small-for-gestational-age and in appropriate-for-gestational-age neonates: a maternal, fetal, or placental contribution? *Biol Neonate* 2003; 84: 67-72.
- Haeckel E. *Generelle Morphologie der Organismen. Allgemeine Grundzuge der organische Formen-Wissenschaft, mechanisch begruendend durch die von Charles Dawrwin reformirte Descendenz-theorie*, 2 vol. (Georg Reimer, Berlin), 1866.
- Hales BF, Robaire B. Paternal exposure to drugs and enviornmental chemicals: effects on progeny outcome. *J Androl* 2001; 22: 927-936.
- Hall B. Changing composition of human milk and early development of appetite control. *Lancet* 1975; 1: 779-781.
- Hall WG. Weaning and growth of artificially reared rats. *Science* 1975; 190: 1313-1315.
- Hammock EA, Young LJ. Variation in the vasopressin V1a receptor promoter and expression: implications for inter- and intraspecific variation in social behaviour. *Eur J Neurosci* 2002; 16: 399-402.
- Hansen S, Ferreira A. Food intake, aggression, and fear behavior in the mother rat: control by neural systems concerned with milk ejection and maternal behavior. *Behav Neurosci* 1986; 100: 64 -70.
- Harlow HF, Suomi ST. Nature of love. *Am Psychol* 1958; 13: 673-685.
- Harlow HF, Zimmermann RR. The development of affectional responses in infant monkey. *Proc Am Physiol Soc* 1958; 102: 501-509.
- Harlow HF. Primary affectional pattern in primates. *Am J Orthopsychiat* 1960; 4: 676-684.
- Hashimoto K, London ED. Specific binding sites for polyamines in the brain. In Carter C. ed., *Neuropharmacology of polyamines*. Academic Press Harcourt Brace & Company, Publishers London, San Diego, New York, Boston, Sydney, Tokyo, Toronto, 1994. pp. 155-165.
- 橋本武夫監修. もつと知りたい母乳育児. メディカ出版、Neonatal Care 2000 年秋季増刊
- 畠山富而. 実験育児学—Human biology の立場から育児学の理論と実践をめざして. メディサイエンス社, 東京, 1981.
- Hatazawa J, Sasajima T, Shimosegawa E, Fujita H, Okudera T, Kanno I, Mineura K, Uemura K. Regional cerebral blood flow response in gray matter heterotopia during finger tapping: An activation study with positron emission tomography. *AJNR* 1996; 17: 479-482.
- Haxby JV, Hoffman EA, Gobbini MI. Human neural systems for face recognition and social communication. *Biol Psychiatry* 2002; 51: 59-67.
- 林 道義. 母性の復権. 中公新書、初版、中央公論新社、東京、1999.
- Hediger ML, Overpeck MD, Kucumarski RJ, Ruan WJ. Association between infants breastfeeding and overweight in young children. *JAMA* 2001; 285: 2453-2460.
- 平山宗宏. 母子健康手帳の改正点と趣旨. *小児科臨床* 2002; 55: 739-741, 2002.
- Herman JP, Figueiredo H, Mueller NK, Ulrich-Lai Y, Ostrander MM, Choi DC, Cullinan WE. Central mechanisms of stress integration: hierarchical circuitry controlling hypothalamo-pituitary-adrenocortical responsiveness. *Front Neuroendocrinol* 2003; 24: 151-180.

- 日高敏隆. 昆虫の行動. 鳥の行動と刷り込み. 河合雅雄編著. 動物の行動そのメカニズムと進化. テレビ大学講座, 旺文社, 1982; pp. 19-23, pp. 38-44.
- Hinuma S, Habata Y, Fujii R, Kawamata Y, Hosoyan M, Fukusumi S, Kitada C, Masuo Y, Asano T, Matsumoto H, Sekiguchi M, Kurokawa T, Nishimura O, Onda H, Fujino M. A prolactin-releasing peptide in the brain. *Nature* 1998; 393: 272-276.
- 平野春雄. おんぶのころ-私の育児哲学-. 初版 1 刷、近代文藝社、東京、1984.
- Hiremagalur BK, Vadlamudi S, Johanning GL, Patel MS. Long-term effects of feeding high carbohydrate diet in pre-weaning period by gastrostomy: a new rat model for obesity. *Int J Obes Relat Metab Disord* 1993; 17: 495-502.
- Hoet JJ, Hanson MA. Intrauterine nutrition: its importance during critical periods for cardiovascular and endocrine development. *J Physiol* 1999; 514: 617-627.
- Hofer MA. Relationships as regulators: A psychologic perspective on bereavement. *Psychosom Med* 1984; 46: 183-197.
- Hofer MA. Unexplained infant crying: an evolutionary perspective. *Acta Paediatr* 2002; 91: 491-496.
- Holstege G, Georgiadis JR, Paans AM, Meiners LC, van der Graaf FH, Reinders AA. Brain activation during human male ejaculation. *J Neurosci* 2003; 23: 9185-9193.
- Hooker D. The origin of the grasping movement in man. *Proc Am Philos Soc* 1938; 79: 597-606.
- Hooker D. A Preliminary Atlas of Early Human Fetal Activity. 1939.
- Hooker D. Fetal reflexes and instinctual processes. *Psychosom Med* 1942; 4: 199-205.
- Horseman ND, Zhao W, Montecino-Rodriguez E, Tanaka M, Nakashima K, Engle SJ, Smith F, Markoff E, Dorshkind K. Defective mammopoiesis, but normal hematopoiesis, in mice with a targeted disruption of the prolactin gene. *EMBO J* 1997; 16: 6926-6935.
- 星 猛. 人間の統合的生命力の加齢変化と健康科学の視点. 香川県医学雑誌, 出版年 pp. 90-98.
- Huang HP, Tsai MJ. Transcription factors involved in pancreatic islet development. *J Biomed Sci* 2000; 7: 27-34.
- Hughes P, Dragunow M. Induction of immediate-early genes and the control of neurotransmitter-regulated gene expression within the nervous system. *Pharmacol Rev* 1995; 47: 133-178.
- 藤崎清道. 特別講演: 健やか親子 21-母子支援としての母乳育児と母子同室-第 9 回母乳育児シンポジウム '00 世界母乳週間、2000 年 8 月 6 日 日本母乳の会
- Houseknecht KL, McGuire MK, Portocarrero CP, McGuire MA, Beerman K. Leptin is present in human milk and is related to maternal plasma leptin concentration and adiposity. *Biochem Biophys Res Commun* 1997; 240: 742-747.
- Humphrey T. The spinal tract of the trigeminal nerve in human embryos between 71/2 and 81/2 weeks of menstrual age and its relation to early fetal behavior. *J Comp Neurol* 1952; 97: 143-209.
- Humphrey T. Function of the nervous system during prenatal life. in Stave U ed. *Perinatal Physiology*, Plenum Medical, 1978, pp. 651-683.

- Huttenlocher PR. Synapse elimination and plasticity in developing human cerebral cortex.. *Am J Ment Defic* 1984; 88: 488-496.
- Hyttén EF. Clinical and chemical studies in human lactation. *Brit Med J* 1954; 2: 175-182.
- Ikonomidou C, Bosch F, Miksa M, Bittigau P, Vockler J, Dikranian K, Tenkova TI, Stefovská V, Turski L, Olney JW. Blockade of NMDA receptors and apoptotic neurodegeneration in the developing brain. *Science* 1999; 283: 70-74.
- Ikonomidou C, Bittigau P, Ishimaru MJ, Wozniak DF, Koch C, Genz K, Price MT, Stefovská V, Horster F, Tenkova T, Dikranian K, Olney JW. Ethanol-induced apoptotic neurodegeneration and fetal alcohol syndrome. *Science* 2000; 287: 1056-1060.
- Ikonomidou C, Bittigau P, Koch C, Genz K, Hoerster F, Felderhoff-Mueser U, Tenkova T, Dikranian K, Olney JW. Neurotransmitters and apoptosis in the developing brain. *Biochem Pharmacol* 2001; 62: 401-405.
- Innis SM. Perinatal biochemistry and physiology of long-chain polyunsaturated fatty acids. *J Pediatr* 2003; 143: S1-S8.
- Insel TR, Harbaugh CR. Lesions of the hypothalamic paraventricular nucleus disrupt the initiation of maternal behavior. *Physiol Behav* 1989; 45: 1033-1041.
- Insel TR, Shapiro LE. Oxytocin receptor distribution reflects social organization in monogamous and polygamous voles. *Proc Natl Acad Sci USA* 1992; 89: 50981-50985.
- Insel TR. Oxytocin-a neuropeptide for affiliation: evidence from behavioral, receptor autoradiographic, and comparative studies. *Psychoneuroendocrinology* 1992; 17: 3-35.
- Insel TR, Wang Z, Ferris CF. Patterns of brain vasopressin receptor distribution associated with social organization in microtine rodents *J Neurosci* 1994; 14: 5381-5392.
- Insel TR. The development of brain and behavior. In Bloom FE, Kupfer DJ eds, *Psychopharmacology*, 4<sup>th</sup> ed Raven Press, Ltd, New York 1995, pp.683-694.
- Insel TR, Hulihan TJ. A gender specific mechanism for pair bonding: oxytocin and partner preference formation in monogamous voles. *Behav Neurosci* 1995; 109: 782-789.
- Insel TR, Young L, Wang Z. Central oxytocin and reproductive behaviors. *Rev Reprod* 1997; 2: 28-37.
- Insel TR. A neurobiological basis of social attachment. *Am J Psychiatry* 1997; 154: 726-735.
- Insel TR, Young LJ. Neuropeptides and the evolution of social behavior. *Curr Opin Neurobiol* 2000; 10: 784-789.
- Insel TR. Social anxiety: From laboratory studies to clinical practice. *Biol Psychiatry* 2002; 51: 1-3.
- Insel TR, Young LJ. The neurobiology of attachment. *Nature Rev Neurosci* 2002; 2: 129-136.
- Ishimaru MJ, Ikonomidou C, Tenkova TI, Dikranian K, Seema MA, Olney JW. Distinguishing excitotoxic from apoptotic neurodegeneration in the developing rat brain. *J Comp Neurol* 1999; 408: 461-476.
- 伊藤 薫. 脳と人間の生物学、培風館、初版第 10 刷発行、1996.
- Ito M. Controller-regulator model of the central nervous system. *J Integ Neurosci* 1: 129-143, 2002.
- 伊藤正男. 中枢神経系の構造と機能 (1)脳の構造と機能. 脳神経科学 Neuroscience. 伊藤正男監修,

- 宮下保司, 御子柴克彦, 廣川信隆, 篠田義一, 金澤一郎編集, 三輪書店, 2003; 4.
- 伊藤正男. 脳の設計図は果たして読めるのか. 理研ニュース Special Issue, Feb 2004, pp. 9-15
- Jackson AA. Perinatal nutrition: The impact on postnatal growth and development. *Pediatrics and Perinatology: The Scientific Basis*, Gluckman PD, Heymann MA eds, 2<sup>nd</sup> ed, 1996, pp.298-303.
- Jaenne J, Alhonen L, Pietilae M, Keinsenen A. Genetic approaches to the cellular functions of polyamines. *EJB* 2004; 271: 877.
- Jacob RA. Folate, DNA methylation, and gene expression: factors of nature and nurture. *Am J Clin Nutr* 2000; 72: 903-904.
- Jacobson CD, Shryne JE, Shapiro F, Gorski RA. Ontogeny of the sexually dimorphic nucleus of the preoptic area. *J Comp Neurol* 1980; 193: 541-548.
- Jacobson SW, Jacobson JL. Breastfeeding and IQ: evaluation of the socio-environmental confounders. *Acta Paediatr* 2002; 91: 258-260.
- Jacquet YF. Selective depression of serum growth hormone during maternal deprivation in rat pups. *Science* 201: 1033-1036, 1978.
- Jannett FJ. Social dynamics of the montane vole *Microtus montanus*, as a paradigm. *Biologist* 1980; 62: 3-19.
- Jannett FJ. Nesting patterns of adult voles. *Microtus montanus*. *J Mammol* 1982; 63: 495-498.
- Modahl C, Green L, Fein D, Morris M, Waterhouse L, Feinstein C, Levin H. Plasma oxytocin levels in autistic children. *Biol Psychiatry* 1998; 43: 270-277.
- Jannett JM 63: 495, 1982
- Jequier E. Is fat intake a risk factor for fat gain in children? *J Clin Endocrinol Metab* 2001; 86: 980-983.
- Jing E, Nillni EA, Sanchez VC, Stuart RC, Good DJ. Deletion of the *Nhlh2* transcription factor decreases the levels of the anorexigenic peptides alpha melanocyte-stimulating hormone and thyrotropin-releasing hormone and implicates prohormone convertases I and II in obesity. *Endocrinology* 2004; 145: 1503-1513.
- Johnson MH, Mareschal D. Cognitive and perceptual development during infancy. *Curr Opin Neurobiol* 2001; 11: 213-218.
- Johnston LB, Clark AJ, Savage MO. Genetic factors contributing to birth weight. *Arch Dis Child Fetal Neonatal Ed* 2002; 86: F2-F3.
- Jones KL, Smith DW. Recognition of the fetal alcohol syndrome in early infancy. *Lancet* 1973; 2: 999-1001.
- Jones KL, Smith DW, Ulleland CN, Streissguth P. Pattern of malformation in offspring of chronic alcoholic mothers. *Lancet* 1973; 1: 1267-1271.
- Jump DB. The biochemistry of n-3 polyunsaturated fatty acids. *J Biol Chem* 2002; 277: 8755-8758.
- 片岡直樹. 新しいタイプの言葉遅れの子どもたちー長時間のテレビ・ビデオ視聴の影響ー. *日本小児科学会雑誌* 106: 1535-1539, 2002
- 河合優年. 出生直後の新生児-児の有能性と子育てについて考えるー 周産期医学 32: 400-404, 2002.
- Kawai M, Yamaguchi M, Murakami T, Shima K, Murata Y, Kishi K. The placenta is not the main source of leptin production in pregnant rat: gestational profile of leptin in plasma and adipose tissues. *Biochem*

- Biophys Res Commun 1997; 240: 798-802.
- Kennell JH, McGrath SK. Beneficial effects of postnatal skin-to-skin contact. *Acta Paediatr* 2003; 92: 272-273.
- Keyser-Marcus L, Stafisso-Sandoz G, Gerecke K, Jasnow A, Nightingale L, Lambert KG, Gatewood J, Kinsley CH. Alterations of medial preoptic area neurons following pregnancy and pregnancy-like steroidal treatment in the rat. *Brain Res Bull* 2001; 55: 737-745.
- Kinsley CH, Madonia L, Gifford GW, Tureski K, Griffin GR, Lowry C, Williams J, Collins J, McLearnie H, Lambert KG. Motherhood improves learning and memory. *Nature* 1999; 402: 137-138.
- 木村尚三郎. これからの家庭と子育てに関する懇談会報告書 大西鐘壽 (企画、編集) 第 21 回日本小児科学会セミナーテキスト「21 世紀への道—子供達のために今如何に 行動すべきか」1991; 9. 22. pp. 89-92. (ビデオ収録)
- 清川輝基. 人間になれない子どもたち. 現代子育ての落とし穴. 初版 3 刷、えい出版社、東京、2003.
- Kjellmer I, Winberg J. The neurobiology of infant-parent interaction in the newborn: introduction. *Acta Paediatr* 1994; Suppl 397: 1-2.
- Klaus MH, Kennel JH. Parent-Infant Bonding. 竹内 徹, 柏木哲夫, 横尾京子訳. 親と子のきずな. 医学書院, 1979.
- Kleiman DG. Monogamy in mammals. *Q Rev Biol* 1977; 52: 39-69
- 小嶋謙四郎. 母子関係と子どもの性格, 川島書店, 1982.
- 小林登. 厚生省「母子相互作用の臨床的、心理行動学的、社会小児科学的意義に関する研究」1955, 1956, 1957 報告書.
- Kocsis K, Kiss J, Csaki A, Halasz B. Location of putative glutamatergic neurons projecting to the medial preoptic area of the rat hypothalamus. *Brain Res Bull* 2003; 61: 459-468.
- 小西行郎. 乳児の発達と生理. *生体の科学* 2003; 54: 146-151.
- Koletzko B, Bremer HJ. Fat content and fatty acid composition of infant formulas. *Acta Paediatr Scand* 1989; 78: 513-521.
- Koletzko B, Decsi T. Role of long-chain polyunsaturated fatty acids in infant growth and development. In Bendich A, Deckelbaum RJ eds, *Primary and secondary Preventive Nutrition*. Totowa, NJ: Humana Press Inc.; 2001. pp. 237-252.
- Kraemer G. A psychobiological theory of attachment. *Behavioral Brain Sci* 1992; 15: 493-541.
- Kuhn CM, Butler SR, Schanberg SM. Selective depression of serum growth hormone during maternal deprivation in rat pups. *Science* 1978; 201: 1034-1036.
- Leaf A, Weber PC. A new era for science in nutrition. *Am J Clin Nutr* 1978; 45: 1048-1053.
- Leckman JF, Goodman WK, North WG, Chappell PB, Price LH, Pauls DL, Anderson GM, Riddle MA, McDougle CJ, Barr LC, et al. The role of central oxytocin in obsessive compulsive disorder and related normal behavior. *Psychoneuroendocrinology* 1994; 19: 723-749.
- Leckman JF, Goodman WK, North WG, Chappell PB, Price LH, Pauls DL, Anderson GM, Riddle MA, McDougle, Barr LC. The role of central oxytocin in obsessive compulsive disorder and related normal behavior.

- Psychoneuro- endocrinology 1994; 19: 723-749.
- Leckman JF, Herman AE. Maternal behavior and developmental psychopathology. *Biol Psychiatry* 2002; 51: 27-43.
- Lefebvre L, Viville S, Barton SC, Ishino F, Keverne EB, Surani MA. Abnormal maternal behaviour and growth retardation associated with loss of the imprinted gene *Mest*. *Nat Genet* 1998; 20: 163-169.
- Li L, Keverne EB, Aparicio SA, Ishino F, Barton SC, Surani MA. Regulation of maternal behavior and offspring growth by paternally expressed *Peg3*. *Science* 1999; 284: 330-333.
- Lincoln DW, Hill A, Wakery JB. The milk-ejection reflex of the rat: an intermittent function not abolished by surgical levels of anaesthesia. *J Endocrinol* 1973; 157: 459-476.
- Liu D, Diorio J, Tannenbaum B, Caldji C, Francis D, Freedman A, Sharma S, Pearson D, Plotsky PM, Meaney MJ. Maternal care, hippocampal glucocorticoid receptors, and hypothalamic-pituitary- adrenal responses to stress. *Science* 1997; 277: 1659-1662.
- Liu D, Diorio J, Day JC, Francis DD, Meaney MJ. Maternal Care, hippocampal synaptogenesis and cognitive development in rats. *Nat Neurosci* 2000; 3: 799-806.
- Lkhider M, Delpal S, Bousquet MO. Rat prolactin in serum, milk, and mammary tissue: Characterization and intracellular localization. *Endocrinology* 1996; 137: 4969-4979.
- Locke R. Preventing obesity: the breast milk-leptin connection. *Acta Paediatr* 2002; 91: 891-894.
- Lorentz K. Der Kumpan in der Umwelt des Vogels. *J Ornithol* 1935; 83: 137.
- Lucas A. Programming by early nutrition in man. *CIBA Found Symp* 1991; 156: 38-50.
- Lucas BK, Ormandy CJ, Binart N, Bridges, Kelly PA. Null mutation of the prolactin receptor gene produces a defect in maternal behavior. *Endocrinology* 1998; 139: 4102-4107.
- Marchini G, Linden A. Cholecystokinin, a satiety signal in newborn infants? *J Devel Physiol* 1992; 17: 215-219.
- 松居 和. 子育てのゆくえ. 子育てをしないアメリカが予見する日本の未来. 初版 4刷、エイデル研究所、東京、1996.
- 松沢哲郎. 進化と隣人 ヒトとチンパンジー. 岩波新書(新赤版)819、岩波書店、第1刷、東京、2002.
- McBride WJ, Murphy JM, Ikemoto S. Localization of brain reinforcement mechanisms: Intracranial self-administration and intracranial place-conditioning studies. *Behav Brain Research* 1999; 101: 129-152.
- McCance RA. Food, growth, and time. *Lancet* 1962; ii: 621-626; 672-675.
- McCarthy MM, Kleopoulos SP, Mobbs CD, Plaff DW. Infusion of antisense oligo-deoxynucleotides to the oxytocin receptor in the ventromedial hypothalamus reduces estrogen-induced sexual reactivity and oxytocin receptor binding in the female rat. *Neuroendocrinology* 1994; 59: 432-440.
- Meisel R, Sachs B. Male reproduction. In Knobil E, Neil J eds, *The Physiology of Reproduction*, vol. 2, 1994, pp. 3-105;
- Miki T, Harris SJ, Wilce PA, Takeuti Y, Bedi KS. Effects of age and alcohol exposure during early life on pyramidal cell numbers in the CA1-CA3 region of the rat hippocampus. *Hippocampus* 2004; 14: 124-134.

- Milberger S, Biederman J, Faraone SV, Jones J. Further evidence of an association between maternal smoking during pregnancy and attention deficit hyperactivity disorder: findings from a high-risk sample of siblings. *J Clin Child Psychol* 1998; 27: 352-358.
- Miller RE, Mirsky IA, Caul WF, Sakata T. Hyperphagia and polyphagia in socially isolated rhesus monkeys. *Science* 1969; 165: 1027-1028.
- Minda H, Molnar S, Burus I, Decsi T. Effect of different types of feeding on fatty acid composition of erythrocyte membrane lipids in full-term infants. *Acta Paediatr* 2002; 91: 874-881.
- 三宅 廉. 母と子の絆を考える－そのルーツを尋ねて. 周産期医学臨時増刊号 母子相互作用－周産期医学からみた育児の原点. 東京医学社, 1983.
- Modney BK, Hatton GI. Maternal behaviors: evidence that they feed back to alter brain morphology and function. *Acta Paediatr Suppl.* 1994; 397: 29-32.
- Mokdad AH, Serdula MK, Dietz WH, Bowman BA, Marks JS, Koplan JP. The continuing epidemic of obesity in the United Sate. *JAMA* 2000; 284: 1650-1651.
- Montagu A. *Touching, The human significance of the skin.* Perennial Library, Harper & Row Publishers, New York, Evanston, SanFrancisco, London, 1971, pp.98-99.
- Mori M, Vigh S, Miyata A, Yoshihara T, Oka S, Arimura A. Oxytocin is the major prolactin releasing factor in the posterior pituitary. *Endocrinology* 1990; 125: 1009-1013.
- Murphy MR, Seckl JR, Burton S et al. Changes in oxytocin and vasopressin secretion during sexual activity in men. *J Clin Endocrinol Metabol* 1987; 65: 738-741.
- Murphy D, Wells S. In vivo gene transfer studies on the regulation and function of the vasopressin and oxytocin genes. *J Neuroendocrinol* 2003; 15: 109-125.
- 内藤寿七郎. 叱らずにほめる子育て－幼児の自己制御能力の発見、第7回日本小児科医会生涯セミナー（平成8年5月11日講演）、健康教育講座講演集、平成9年3月31日、pp.179-194
- 中川志郎. なぜ動物は子供をなめるのか. 親と子の絆を探る. 初版1刷、主婦の友社、東京、1990.
- 中島洋. 分娩室での早期接触とその後の管理-心の曙そしてDNAスイッチ-. 周産期医学 2002; 32 増刊号: 405-409.
- Nash LT. The development of the mother-infant relationship in wild baboons. (*Papio anubis*). *Anim Behav* 1978; 26:746-759.
- Neel JV. Diabetes mellitus: a "thrifty" genotype rendered detrimental by "progress"? *Am J Hum Genet* 1962; 14: 353-362.
- 根岸正勝、根岸和子. はじめての母乳育児. 妊娠中の準備から離乳・断乳まで. 初版、池田書店、東京、1988.
- Neill JD, Nagy GM. Prolactin secretion and its control. *The Physiology of Reproduction. Second Edition.* edited by Knobil E, Neill JD, Raven Press, Ltd., New York, pp. 1833-1860, 1994.
- Neumann ID, Torner L, Wigger A. Brain oxytocin: differential inhibition of neuroendocrine stress response and anxiety-related behavior in virgin, pregnant and lactating rats *Neuroscience* 2000; 95: 567-575.



- Nishimori K, Young LJ, Guo Q, Wang Z, Insel TR, Matzuk M. Oxytocin is required for nursing but is not essential for parturition or reproductive behavior. *Proc Natl Acad Sci USA* 1996; 93: 11699-11704.
- Noguchi T. Retarded cerebral growth of hormone-deficient mice. *Comp Biochem Physiol* 1991; 98C: 239-248.
- Numan M., Callahan C. The connection of the medial preoptic region and maternal behavior in the rat. *Physiol Beh* 1980; 25: 653-665.
- Numan M. Preoptic area neural circuitry relevant to maternal behavior in the rat. In Krasnegor NA, Blass EM, Hofer MA. & Smotherman WP. (eds.), *Perinatal Development*, Academic Press (Orlando, San Diego, New York, Austin, Boston, London, Sydney, Tokyo, Toronto) 1987, pp. 275-298.
- Numan M. Maternal behavior. In *The Physiology of Reproduction*, 2nd Ed. Knobil E & Neill JD eds, Raven Press, New York, pp. 221-302, 1994.
- Ogawa S, Eng V, Taylor J, et al. Roles of estrogen receptor-alpha expression in reproduction-related behaviors in female mice. *Endocrinology* 1998; 139: 5070-5081.
- Okamoto H. *J Hepato-Biliary-Pancreatic Surgery* 1999; 6: 254-262.
- 大西鐘壽. 赤ちゃんがなにかを訴えているー育児に関する発達生物学的考察ー. *小児保健研究* 1993; 52: 317-324.
- 大西鐘壽, 石井真美, 大西喜久子. 冷凍母乳の現状と将来. *産婦人科診療*, 1995; 71: 186-190.
- 大西鐘壽, 石井真美. A. 乳汁分泌とその生物学的意義. VIII 授乳と保育 新女性医学大系 25 周産期正常分娩 武谷雄二総編集, 中山書店, 1998.10.31.
- 大西鐘壽. 母乳権母親が母乳を飲ませる権利と赤ちゃんが母乳を飲む権利. 93' 第2回「母乳をすすめるための産科医と小児科医の会」, 1993.7.31-8.1. (株) 伸樹社, 1994.7.31. pp.153-162.
- 大西鐘壽. 教育講演: 母性のスイッチ健やか親子 21ー母子支援としての母乳育児と母子同室ー第9回 母乳育児シンポジウム '00 世界母乳週間、2000年8月6日 日本母乳の会
- 大西鐘壽. 妊婦の養生の重要性についてー成人病予防の視点からみた胎児環境. 赤ちゃんがなにかを訴えている. アート印刷, 2002, pp. 111-136.
- 大西鐘壽. 乳汁分泌とその生物学的仕組みについて. 赤ちゃんがなにかを訴えている. アート印刷, 2002, pp. 137-168.
- 大西鐘壽. 提言「日本文化と小児保健」. *小児保健研究* 62: 413, 2003.
- 大山牧子, 金森あかね, 瀬尾智子, 瀬川雅史, 本郷寛子, 涌谷桐子. 資料 母乳と母乳育児に関する方針ーアメリカ小児科学会の勧告ーアメリカ小児科学会、母乳育児に関するワーキンググループ 周産期医学 2001; 31: 555-562.
- 大山牧子. 連載あなたのなぜに答える母乳のはなし *Neonatal Care* 2003; 16:78 (現在連載中)
- 岡村博行. 母性を育む. ソフロロジー式出産と母乳育児. 初版1刷、日本評論社、東京、2002.
- Ormandy CJ, Camus A, Barra J, Damotte D, Lucas B, Buteau H, Edery M, Brousse N, Babinet C, Binart N, Kelly PA. Null mutation of the prolactin receptor gene produces multiple reproductive defects in the mouse. *Genes Dev* 1997; 11: 167-178.

- 菅坂直行: 意識と注意 (1) 意識. 脳神経科学 Neuroscience. 伊藤正男監修, 宮下保司, 御子柴克彦, 廣川信隆, 篠田義一, 金澤一郎編集, 三輪書店, 2003; 4, pp771-779.
- Oumi T, Ukena K, Matsushima O, Ikeda T, Fujita T, Minakata H, Nomoto K. Annetocin, an annelid oxytocin-related peptide, induces egg-laying behavior in the earthworm, *Eisenia foetida*. *J Exp Zool* 1996; 276: 151-156.
- Patel MS, Srinivasan M. Metabolic programming: causes and consequences. *J Biol Chem* 2002; 277: 1629-1632.
- Pedersen CA, Pramje AJ Jr. Induction of maternal behavior in virgin rats after intracerebroventricular administration of oxytocin. *Proc Natl Acad Sci USA* 1979; 76: 6661-6665.
- Pedersen CA, Caldwell JD, Johnson MF, Fort SA, Prange AJ. Oxytocin antiserum delays onset of ovarian steroid-induced maternal behavior. *Neuropeptides* 1985; 6: 175-182.
- Pfaff DW, Schwartz-Giblin S. Cellular and molecular mechanisms of female reproductive behaviors. In Knobil E and Neill JD eds. *The Physiology of Reproduction*, 1994 Raven Press, New York, vol. 2, pp.107-220
- Pierce RA, Nguyen NM. Prenatal nicotine exposure and abnormal lung function. *Am J Respir Cell Mol Biol* 2002; 26: 10-13.
- Pitkow LJ, Sharer CA, Ren X, Insel TR, Terwilliger EF, Young LJ. Facilitation of affiliation and pair-bond formation by vasopressin receptor gene transfer into the ventral forebrain of a monogamous vole. *J Neurosci* 2001; 21: 7392-7396.
- Pryce CR, Bettschen D, Feldon J. Comparison of the effects of early handling and early deprivation on maternal care in the rat. *Dev Psychobiol* 2001; 38: 239-251.
- P-Vinay MC, Belair L, Kayser C, Kelly PA. *Proc Natl Acad Sci USA* 88: 6687-6690, 1991
- Ravelli AC, van Meulen JH, Michels RP, Osmond C, Barker DJ, Hales CN, Bleker OP. Glucose tolerance in adults after prenatal exposure to famine. *Lancet* 1998; 352: 173-177.
- Rey J. Breastfeeding and cognitive development. *Acta Paediatr Suppl* 2003; 92: 11-18.
- Rodriguez-Palmero M, Koletzko B, Kunz C, Jensen RG. Nutritional and biochemical properties of human milk: II. Lipids, micronutrients and bioactive factors. *Clin Perinatol* 1999; 26: 335-359.
- Rosenblatt JP, Siegel HI. Maternal behavior in the laboratory rat. In Bell RW Smotherman eds, *Maternal Influences and Early Behavior*, pp155-199, Jamaica. NY: Spectrum/ 1980
- Rosenblatt JS. Biologic and behavioral factors underlying the onset and maintenance of maternal behavior in the rat. In Krasnegor NA, Blass EM, Hofer MA, Smotherman, WP. (eds.), *Perinatal Development*, Academic Press (Orlando, San Diego, New York, Austin, Boston, London, Sydney, Tokyo, Toronto), pp. 321-341, 1987.
- Russell JA, Douglas AJ, Ingram CD. Brain preparations for maternity--adaptive changes in behavioral and neuroendocrine systems during pregnancy and lactation. An overview. *Prog Brain Res* 2001; 133: 1-38.
- Sakaguchi K, Tanaka M, Ohkubo T, Doh-Ura K, Fujikawa T, Sudo S., Nakashima K. Induction of brain prolactin receptor long-form mRNA expression and maternal behavior in pup-contacted male rats:

- Promotion by prolactin administration and suppression by female contact. *Neuroendocrinology* 1996; 63: 559-568.
- Savino F, Costamagna M, Prino A, Oggero R, Silvestro L. Leptin levels in breast-fed and formula-fed infants. *Acta Paediatr* 2002; 91: 897-902.
- Schanberg SM, Evoniuk G., Kuhn CM. Tactile and nutritional aspects of maternal care: Specific regulators of neuroendocrine function and cellular development (41779). *Proc Soc Exp Biol Med* 1984; 175: 135-146.
- Schlaggar BL, O'Leary DD. Potential of visual cortex to develop an array of functional units unique to somatosensory cortex. *Science* 1991; 252: 1556-1560.
- 瀬尾智子 (翻訳者代表). 生後 14 日間の母乳育児援助エビデンスに基づくガイドライン. 国際ラクテーション・コンサルタント協会. 2003.9.
- 瀬川昌也. こどもの脳はいかにして大人の脳になるか. *科学* 2001; 71: 703-711.
- 関修一郎. 元厚生官僚、および周産期専門医からみた母乳. 93 第 2 回「母乳をすすめるための産科医と小児科医の会」, 1993.7.31-8.1. (株) 伸樹社, 1994.7.31. pp.116-125..
- 志田紀子. 遊びとしつけ 子育てが楽しくなるコツ. 学陽書房, 2001
- Simopoulos AP. Omega-3 fatty acids in health and disease and in growth and development. *Am J Clin Nutr* 1991; 54: 438-463.
- Singhal A, Fewtrell M, Cole TJ, Lucas A. Low nutrient intake and early growth for later insulin resistance in adolescents born preterm. *Lancet* 2003; 361: 1089-1097.
- Slotkin TA. Ornithine decarboxylase as a tool in developmental neurobiology. *Life Sci* 1979; 24: 1623-1630.
- Smith-Kirwin SM, O'Connor DM, De Johnston J, Lancey ED, Hassink SG, Funanage VL. Leptin expression in human mammary epithelial cells and breast milk. *J Clin Endocrinol Metab* 1998; 83: 1810-1813.
- Soares MJ, Faria TN, Roby KF, Deb S. Pregnancy and the prolactin family of hormones: coordination of anterior pituitary, uterine, and placental expression. *Endocr Rev* 1991; 12: 402-423.
- Stratton K, Wallace R, Bondurant S, editors. Clearing the smoke. Assessing the science base for tobacco harm reduction. National Academy Press, Washington, DC, 2001.
- Sugiyama T, Minoura H, Toyoda N, Sakaguchi K, Tanaka M, Sudo S, Nakashima K. Pup contact induces the expression of long form prolactin receptor mRNA in the brain of female rats: Effects of ovariectomy and a hypophysectomy on the receptor gene expression. *J Endocrinol* 1996; 149: 335-340.
- Sugiyama T, Tanaka M, Ohkubo, Minoura H, Kawade N, Tanaka M, Nakashima K. Induction of brain prolactin receptor long-form mRNA expression and maternal behavior in pup-contacted male rats: promotion by prolactin administration and suppression by female contact. *Neuroendocrinology* 1996; 63: 559-568.
- Summerlee AJS, Lincoln DW. Electrophysiological recordings from oxytocinergic neurons during suckling in the unanaesthetized lactating rat. *J Endocrinol* 1981; 90: 255-265.
- 鈴木秀雄. 生物は光をどう利用するか. *日本医師会雑誌* 1980; 84 : 163-170.
- Swanson LW. Cerebral hemisphere regulation of motivated behavior. *Brain Res* 2001; 886: 113-164.

- 竹下秀子. 赤ちゃんの手とまなざし. ことばを生まだす進化の道すじ. 岩波科学ライブラリー78  
岩波書店、東京、2001、第1刷.
- 田中 実、藤川隆彦、中島邦夫. プロラクチンによる保育行動誘導及びストレス性胃潰瘍予防作用の  
分子基盤. 蛋白質核酸酵素 2000; 45: 346-354.
- 谷村雅子、高橋香代、片岡直樹、富田和巳、田辺 功、安田 正、杉原茂孝、清野佳紀.. 提言乳幼児  
のいテレビ・ビデオ長時間視聴は危険です. 日本小児科学会雑誌 2004; 108: 709-712.
- Takahata Y, Takada H, Nomura A, Nakayama H, Ohshima K, Hara T. Detection of interferon-gamma-inducible  
chemokines in human milk. Acta Paediatr 2003; 92: 659-665.
- Tomizawa K, Iga N, Lu YF, Moriwaki A, Matsushita M, Li ST, Miyamoto O, Itano T, Matsui H. Oxytocin  
improves long-lasting spatial memory during motherhood through MAP kinase cascade. Nat Neurosci 2003;  
6: 384-390.
- 津本忠治. 脳と発達. 環境と脳の可塑性. 1986. 2.16. 朝倉書店
- Uvans-Moberg K. Physiological and endocrine effects of social contact. Ann N Y Acad Sci 1997; 807:146-163.
- Van Leengoed E, Kerker E, Swanson HH. Inhibition of post-partum maternal behavior in the rat by injecting an  
oxytocin antagonist into the cerebral ventricles. J Endocrinol 1987; 112: 275-282.
- Wakerley JB, Lincoln DW. The milk ejection reflex of the rat: a 20- to 40-fold acceleration in the firing of  
paraventricular neurons during the release of oxytocin. J Endocrinol 1973; 57: 477-493.
- 渡辺久子. 母子臨床と世代間伝達. 金剛出版 2000. 5.
- Williams JR, Insel TR, Harbaugh CR, Carter CS. Oxytocin administered centrally facilitated formation of  
partner preference in prairie voles (*Microtus ochrogaster*). J Neuroendocrinol 1994; 6: 247-250.
- Winberg J, Porter RH. Olfaction and human neonatal behaviour: clinical implications. Acta Paediatr 1998; 87:  
6-10.
- Winnicott WD. Primary maternal preoccupation. In : Collected papers: Through Paediatrics to Psycho-Analysis,  
New York, Prequin Books, 1964.
- Winnicott DW. 1982 (竹内徹: 講演録 周産期における母子関係. 助産婦雑誌 1982; 36: 47.)
- Yagi T. Molecular mechanisms of Fyn-tyrosine kinase for regulating mammalian behaviors and ethanol  
sensitivity. Biochem Pharmacol 1999; 57: 845-850.
- 山内芳忠. 母乳栄養学における乳児期の成長. 周産期医学 26: 7-10, 1996.
- 山内逸郎. HUMAN BIOLOGY の原点. 第21回日本小児科学会セミナー. 21世紀への道—子供達  
のために今如何に行動すべきか—大西鐘壽 (企画・編集・会長)、1991.9.22. 日本小児科学会 香川  
県小児科会 pp. 47-56 1991. (ビデオ収録)
- 山内逸郎. 私の願うこれからの新生児医療「時は流れる、時代は変わる」—21世紀を展望して—  
NICU (現 Neonatal Care) 1993 年秋季増刊 (通巻 73 号) 17-21
- 山内逸郎. 母乳保育成功のための10ヶ条. 治療 74: 14-17, 1992.
- 山本高治郎. 母乳. 岩波新書 (黄版) 230、初版6刷、岩波書店、東京、1987.
- Yates FE. Self-organizing systems. In Boyd CAR & Noble D eds: The Logic of Life, Oxford University Press,