

international
journal
of
**Andro
logy**

Volume 5
1982

CHIEF EDITOR N. E. SKAKKEBÆK . DENMARK
ASSOCIATE EDITORS A. AAKVAAG . NORWAY
C. W. BARDIN . USA
D. M. DE KRETZER . AUSTRALIA
S. S. HOWARDS . USA
E. JOHANNISSON . SWITZERLAND
E. NIESCHLAG . W. GERMANY
R. SHARPE . SCOTLAND
M. SHIRAI . JAPAN
O. VILAR . ARGENTINA

Scriptor · Copenhagen

**Bayerische
Staatsbibliothek
München**

Editorial Board

A. Aakvaag, Norway
A. Bane, Sweden
C. W. Bardin, USA
G. S. Bernstein, USA
A. W. Blackshaw, Australia
B. Boettcher, Australia
H. Burger, Australia
M. H. Burgos, Argentina
F. Comhaire, Belgium
D. M. de Kretser, Australia
J. Egozcue, Spain
R. Eliasson, Sweden
L. Ewing, USA
A. Fabbrini, Italy
D. W. Fawcett, USA
M. Freund, USA
J. Frick, Austria
R. Guerra-Garcia, Peru

S. S. Howards, USA
B. Hudson, Australia
H. Jackson, England
E. Johannisson, Switzerland
M. Kormanó, Finland
J. Kremer, Holland
J. C. Lavieri, Argentina
B. Lunenfeld, Israel
S. Marina, Spain
J. Molnár, Hungary
L. Nicander, Norway
E. Nieschlag, W. Germany
M-C. Orgebin-Crist, USA
A. Oriol-Bosch, Spain
C. A. Paulsen, USA
J. M. Pomerol, Spain
M. R. N. Prasad, Switzerland
M. Ritzén, Sweden

M. A. Rivarola, Argentina
E. Rosemberg, USA
R. Schoysman, Belgium
R. S. Seamark, Australia
S. J. Segal, USA
B. P. Setchell, England
S. M. Shahani, India
R. Sharpe, Scotland
M. Shirai, Japan
N. E. Skakkebaek, Denmark
K. D. Smith, USA
E. Steinberger, USA
B. Tamaoki, Japan
P. Troen, USA
G. M. H. Waites, England
P. Walsh, USA
J. A. van Zyl, South Africa
O. Vilar, Argentina

<i>WHO, Special Programme of Research in Human Reproduction: Sequelae of vasectomy. Report of a meeting</i>	1
<i>Pérez-Plaza M., Padrón R. S., Más J. & Peralta H.: Semen analyses in men with asymptomatic genital gonorrhoea</i>	6
<i>Johannisson E., Norén S., Riottton G. & Eliasson R.: Microfluorometric assessment of sperm maturation in testicular biopsies from men with histologically normal or reduced spermatogenesis</i>	11
<i>Vidal F., Templado C., Navarro J., Marina S. & Egozcue J.: Meiotic and synaptonemal complex studies in a 14/21 translocation carrier</i>	21
<i>Ulvik N. M., Dahl E. & Hars R.: Classification of plastic-embedded rat seminiferous epithelium prior to electron microscopy</i>	27
<i>Lewin L. M., Nevo Z., Gabsu A. & Weissenberg R.: The role of sperm-bound hyaluronidase in the dispersal of the cumulus oophorus surrounding rat ova</i>	37
<i>Bortolussi M., Colombo L., Strinna M., Bottaro G. & Vassanelli P.: Arterialization of the liver prevents testicular atrophy in portacaval shunted rats</i>	45
<i>Cavicchia J. C. & Rodriguez E. M.: The effect of copulation on the plasma antidiuretic activity of the male rat</i>	52
<i>Karpe B., Hagenäs L., Plöen L. & Ritzén E. M.: Studies on the scrotal testis in unilateral experimental cryptorchidism in rat and guinea pig</i>	59
<i>Paz G. F., Winter J. S. D., Reyes F. I. & Faiman C.: Determination of Δ^5 3β-hydroxysteroid dehydrogenase activity in intact isolated rat Leydig cells</i>	74
<i>Hodgson Y. M. & de Kretser D. M.: Serum testosterone response to single injection of hCG ovine-LH and LHRH in male rats</i>	81
<i>Nagendranath N., Karanth S., Sheth A. R. & Juneja H. S.: An assessment of inhibin-like activity secreted by Sertoli cells in culture using castrated adult male rats</i>	92
<i>Gordeladze J. O., Conti M., Purvis K. & Hansson V.: The effect of calmodulin, trifluoperazine and other psychoactive drugs on the activity of the Mn²⁺-dependent adenyl cyclase (AC) in testicular germ cells</i>	103
<i>Curtis D., Thomas A., Williams J. L., Lenton E. & Cooke I. D.: Cytogenetic and histological studies in a series of subfertile males</i>	113
<i>Mazzocchi G., Robba C., Rebuffat P., Gottardo G. & Nussdorfer G. G.: Effects of a chronic treatment with testosterone on the morphology of the interstitial cells of the rat testis: an ultrastructural stereologic study</i>	130
<i>Huhaniemi I., Tikhala L. & Martikainen H.: Diurnal variation of gonadotrophin receptors in the rat testis</i>	137
<i>Leinonen P., Bolton N. & Vihko R.: Human testicular LH receptors: correlations with circulating gonadotrophins and testicular steroid secretion</i>	145
<i>Cao Y.-Q., Sundaram K., Bardin C. W., Rivier J. & Vale W.: Direct inhibition of testicular steroidogenesis and gonadotrophin receptor levels by [(<i>im</i>Bzl)-D-His⁶, Pro⁹-NET]GnRH and [D-Trp⁶, Pro⁹-NET]GnRH, potent agonists of GnRH</i>	158

<i>Schwarzstein L., Aparicio N. J. & Schally A. V.</i> : D-Tryptophan-6-luteinizing hormone-releasing hormone in the treatment of normogonadotropic oligoasthenozoospermia	171
<i>Fosså S. D., Klepp O., Molne K. & Aakvaag A.</i> : Testicular function after unilateral orchiectomy for cancer and before further treatment	179
<i>Zipf W. B., Kelch R. P. & Hopwood N. J.</i> : Testicular responsiveness to human chorionic gonadotrophin in growth hormone deficient pre-pubertal boys: lack of effect of replacement therapy	185
<i>Aldred L. F. & Cooke B. A.</i> : The deleterious effect of mechanical dissociation of rat testes on the functional activity and purification of Leydig cells using Percoll gradients	191
<i>Aruldas M. M., Valivullah H. M. & Govindarajulu P.</i> : Specific effect of the thyroid on testicular enzymes involved in carbohydrate metabolism. I. Hypothyroidism	196
<i>Tso W.-W. & Lee C.-S.</i> : Lactate dehydrogenase-X: an isozyme particularly sensitive to gossypol inhibition	205
<i>Cohen J., Mooyaart M., Vreeburg J. T. M. & Zeilmaker G. H.</i> : Fertilization of hamster ova by human spermatozoa in relation to other semen parameters	210
<i>Nieschlag E.</i> : Editorial: Current status of testosterone substitution therapy	225
<i>Chemes H. E., Pasqualini T., Rivarola M. A. & Bergadá C.</i> : Is testosterone involved in the initiation of spermatogenesis in humans? A clinicopathological presentation and physiological considerations in four patients with Leydig cell tumours of the testis or secondary Leydig cell hyperplasia	229
<i>Frick J., Danner C., Kunit G., Joos H. & Köhle R.</i> : Spermatogenesis in men treated with injections of medroxyprogesterone acetate combined with testosterone enanthate ..	246
<i>Cheng C. Y. & Boettcher B.</i> : Partial characterization of human spermatozoal phosphodiesterase and adenylate cyclase and the effect of steroids on their activities	253
<i>Bostofte E., Serup J. & Rebbe H.</i> : Relation between sperm count and semen volume, and pregnancies obtained during a twenty-year follow-up period	267
<i>Danner C., Frick J. & Rován E.</i> : Testicular function after torsion	276
<i>Kluin P. M., Kramer M. F. & de Rooij D. G.</i> : Spermatogenesis in the immature mouse proceeds faster than in the adult	282
<i>Dixit V. P. & Gupta R. S.</i> : Antispermatic/antiandrogenic properties of solasodine (C ₂₇ H ₄₃ O ₂ N) obtained from solanum xanthocarpum berries on the male genital tract of dog (Canis-familiaris). A histophysiological approach	295
<i>Paz G. F. & Homonnai T. Z.</i> : A direct effect of α -chlorohydrin on rat epididymal spermatozoa	308
<i>Tso W.-W. & Lee C. S.</i> : Potassium leakage: not the cause of gossypol induced anti-motility in spermatozoa	317
<i>Bergh A.</i> : Local differences in Leydig cell morphology in the adult rat testis: evidence for a local control of Leydig cells by adjacent seminiferous tubules	325
<i>Rao M. R. & Govindarajulu P.</i> : Effect of prolactin inhibition by bromocriptine on testicular metabolism in the adult rat	331
<i>Sattayasai N. & Panyim S.</i> : Nature of the proteins which form disulfide bonds during the maturation of rat spermatozoa	337
<i>Mayorga L. S. & Bertini F.</i> : Effect of androgens on the activity of acid hydrolases in rat epididymis	345
<i>Bancroft J.</i> : Editorial: Erectile impotence – psyche or soma?	353
<i>Ekman P.</i> : Current concepts in the management of testicular germ cell tumours in adults.	
A review	356

<i>de la Torre B., Norén S., Hedman M., Ritzén M. & Diczfalusy E.</i> : Intratesticular and plasma steroid profiles in fertile and infertile men	367
<i>Bostofte E., Serup J. & Rebbe H.</i> : Relation between morphologically abnormal spermatozoa and pregnancies obtained during a twenty-year follow-up period	379
<i>Baumans V., Dijkstra G. & Wensing C. J. G.</i> : The effect of orchidectomy on gubernacular outgrowth and regression in the dog	387
<i>Steven F. S., Griffin M. M. & Chantler E. N.</i> : Inhibition of human and bovine sperm acrosin by divalent metal ions. Possible role of zinc as a regulator of acrosin activity ..	401
<i>Didolkar A. K., Bertram H. P., Zaidi P., Neumann F. & Nieschlag E.</i> : Comparison of the antispermatogenic effects of a new D-homo-steroid and testosterone in rabbits	413
<i>Chulavatnatol M.</i> : Motility initiation of quiescent spermatozoa from rat caudal epididymis: effects of pH, viscosity, osmolality and inhibitors	425
<i>Kovacević R., Krsmanović L., Stojiljković S., Simonović I., Marić D. & Andjuz R. K.</i> : Effects of bromocriptine-induced hypoprolactinaemia on the developmental pattern of androgen and LH levels in the male rat	437
<i>Book Reviews</i>	448
<i>de Kretser D.</i> : Editorial. Testicular biopsy in the management of male infertility	449
<i>Abdelmassih R., Fujisaki S. & Faúndes A.</i> : Prognosis of varicocele in the treatment of infertility, based on pre-surgery characteristics	452
<i>Suominen J. & Söderström K.-O.</i> : Lymphocyte infiltration in human testicular biopsies ..	461
<i>Schill W.-B., Jünger D., Unterburger P. & Braun S.</i> : Combined hMG/hCG treatment in subfertile men with idiopathic normogonadotrophic oligozoospermia	467
<i>Roomans G. M., Lundevall E., Björndahl L. & Kvist U.</i> : Removal of zinc from subcellular regions of human spermatozoa by EDTA treatment studied by X-ray microanalysis ..	478
<i>Kavanagh J. P., Darby C. & Costello C. B.</i> : The response of seven prostatic fluid components to prostatic disease	487
<i>Orlando C., Caldini A. L., Fiorelli G., Cuomo S. & Serio M.</i> : ATP and ADP content of human ejaculated spermatozoa	497
<i>Kavanagh J. P. & Darby C.</i> : The interrelationships between acid phosphatase, aminopeptidase, diamine oxidase, citric acid, β -glucuronidase, pH and zinc in human prostatic fluid	503
<i>Brooks D. E.</i> : Purification of rat epididymal proteins 'D' and 'E', demonstration of shared immunological determinants, and identification of regional synthesis and secretion	513
<i>Shiu R. P. C., Paz G. & Faiman C.</i> : Prolactin receptors in interstitial cells of testes from rats at different stages of development	525
<i>Balasubramanian K., Pereira B. M. J. & Govindarajulu P.</i> : Epididymal carbohydrate metabolism in experimental hypercorticism: studies on mature male rats ...	534
<i>Sizonenko P. C. & Cuendet A.</i> : Editorial. Cryptorchidism and its hormonal and surgical treatment: a continuing controversy	545
<i>Karpe B., Fredericsson B., Svensson J. & Ritzén E. M.</i> : Testosterone concentration within the tunica vaginalis of boys and adult men	549
<i>Levi S. N., Dix C. J., Thomas M. G. & Cooke B. A.</i> : Isolation and characterization of plasma membranes containing LH sensitive adenylate cyclase from a Leydig cell tumour	557
<i>Levi S. N., Schumacher M., Dix C. J., Thomas M. G. & Cooke B. A.</i> : Guanine nucleotide mediated desensitization of adenylate cyclase in cell free preparations from a Leydig cell tumour	570
<i>Caldini A. L., Orlando C., Fiorelli G., Cuomo S. & Serio M.</i> : ATP and ADP content of human ejaculated spermatozoa	579

<i>Fiet J., Morville R., Chemama D., Villette J. M., Gourmel B., Brerault J. L. & Dreux C.:</i> Percutaneous absorption of 5 α -dihydrotestosterone in man. I. Plasma androgen and gonadotrophin levels in normal adult men after percutaneous administration of 5 α -dihydrotestosterone	586
<i>Chemama D., Morville R., Fiet J., Villette J. M., Tabuteau F., Brerault J. L. & Passa Ph.:</i> Percutaneous absorption of 5 α -dihydrotestosterone in man. II. Percutaneous administration of 5 α -dihydrotestosterone in hypogonadal men with idiopathic haemochromatosis; clinical, metabolic and hormonal effectiveness	595
<i>Arslan M., Khan S. A. & Qazi M. H.:</i> Effect of an LHRH analogue on testicular function in the immature monkey (<i>Macaca mulatta</i>)	607
<i>Harris Rice M. E., Mason J. I. & Bartke A.:</i> Suppression of pituitary and testicular function in rats by a transplanted adrenocortical carcinoma	613
<i>Garberi J. C., Fontana J. D. & Blaquier J. A.:</i> Carbohydrate composition of specific rat epididymal protein	619
<i>Jean-Faucher Ch., Berger M., de Turckheim M., Veyssiere G. & Jean C.:</i> Effect of preweaning undernutrition on testicular development in male mice	627
<i>Johnsen Ø., Mås Diaz J. & Eliasson R.:</i> Short Communication. Gossypol; a potent inhibitor of human sperm acrosomal proteinase	636

- Aakvaag A., 179, 448
 Abdelmassih R., 452
 Aldred L. F., 191
 Alexander N. J., 1
 Andrus R. K. 437
 Aparicio N., 171
 Arslan M., 607
- Balasubramanian K., 534
 Bancroft J., 353
 Bardin C. W., 158
 Bartke A., 613
 Baumans V., 387
 Bergadá C., 229
 Berger M., 627
 Bergh A., 325
 Bertini F., 345
 Bertram H. P., 413
 Björndahl L., 478
 Blaquier J. A., 619
 Boettcher B., 253
 Bolton N., 145
 Bortolussi M., 45
 Bostofte E., 267
 Bottaro G., 45
 Braun S., 467
 Brerault J. L., 586, 595
 Brooks D. E., 513
- Cao Y.-C., 158
 Calдини A. L., 497, 579
 Cavicchia J. C., 52
 Chakravarti R. N., 1
 Chantler E. N., 401
 Chemama D., 586, 595
 Chemes H. E., 229
 Cheng C. Y., 253
 Chulavatnatol M., 425
 Clarkson T. B., 1
 Cohen J., 210
 Colombo L., 45
 Comhaire F., 448
 Conti M., 103
 Cooke B. A., 191, 557, 570
 Cooke I. D., 113
- Costello C. B., 487
 Crozier R., 1
 Cuendet A., 545
 Cuomo S., 497, 579
 Curtis D., 113
- Dahl E., 27
 Danner C., 246, 276
 Darby C., 487, 503
 de Chun L., 1
 de Kretser D. M., 81, 449
 de la Torre B., 367
 de Rooij D. G., 282
 de Turckheim M., 627
 Diáz J. M., 636
 Diczfalusy E., 367
 Didolkar A. K., 413
 Dijkstra G., 387
 Dix C. J., 557, 570
 Dixit V. P., 295
 Dreux C., 586
 Dusitsin N., 1
- Egozcue J., 21
 Ekman P., 356
 Eliasson R., 11, 636
- Faiman C., 74, 525
 Faúndes A., 452
 Fiet J., 586, 595
 Fiorelli G., 579, 497
 Fontana J. D., 619
 Fosså S. D., 179
 Fredricsson B., 549
 Frick J., 246
 Fujisaki S., 452
- Gabsu A., 37
 Garberi J. C., 618
 Goldacre M. J., 1
 Gordeladze J. O., 103
 Gottardo G., 130
 Gourmel B., 586
 Govindarajulu P., 196, 331, 534
 Griffin M. M., 401
 Gupta R. S., 295

Hagenäs L., 59
 Hansson V., 103
 Hars R., 27
 Hedman M., 367
 Hodgson Y. M., 81
 Homonnai T. Z., 308
 Hopwood N. J., 185
 Huhtaniemi I., 137

Jean C., 627
 Jean-Faucher C., 627
 Johannison E., 11
 Johnsen Ø., 636
 Jones W. R., 1
 Joos H., 246
 Juneja H. S., 92
 Jüngst D., 467

Karanth S., 92
 Karpe B., 59, 549
 Kavanagh J. P., 487, 503
 Kelch R. P., 185
 Khan S. A., 607
 Klepp O., 179
 Kluin P. M., 282
 Kovacević R., 437
 Kramer M. F., 282
 Krsmanović L., 437
 Kunit G., 246
 Kvist U., 478
 Köhle R., 246

Lee C.-S., 205, 317
 Leinonen P., 145
 Lenton E., 113
 Levi S. N., 557, 570
 Lewin L. M., 37
 Lundevall E., 478

Marić D., 437
 Marina S., 21
 Martikainen H., 137
 Más J., 1
 Mason J. I., 613
 Massey F. J., 1
 Mayorga L. S., 345
 Mazzocchi G., 130
 Molne K., 179
 Mooyaart M., 210
 Morville R., 586, 595

Nagendranath N., 92
 Navarro J., 21
 Neumann F., 413
 Nevo Z., 37
 Nieschlag E., 225, 413
 Norén S., 11, 367
 Nussdorfer G. G., 130

Orlando C., 497, 579

Padron R. S., 6
 Panyim S., 337
 Pasqualini T., 229
 Passa P., 595
 Paz G. F., 74, 308, 525
 Peralta H., 6
 Pérez-Plaza M., 6
 Pereira B. M. J., 534
 Plöen L., 59
 Prasad M. R. N., 1
 Purvis K., 103

Qazi M. H., 607

Rao M. R., 331
 Rebbe H., 267, 279
 Rebuffat P., 130
 Reyes F. I., 74
 Rice M. E. H., 613
 Riotton G., 11
 Ritzén M., 59, 367, 549
 Rivarola M. A., 229
 Rivier J., 158
 Robba C., 130
 Rodriguez E. M., 52
 Roomans G. M., 478
 Rose N. R., 1
 Rován E., 276

Sattayasai N., 337
 Schally A. V., 171
 Schill W.-B., 467
 Schumacher M., 570
 Schwarzstein L., 171
 Serio M., 497, 579
 Serup J., 267, 319
 Sheth A. R., 92
 Shiu R. P. C., 525
 Shunqiang L., 1
 Simonović J., 437

Sizonenko P. C., 545
Steven F. S., 401
Stojilković S., 437
Strinna M., 45
Sundaram K., 158
Suominen J., 461
Svensson J., 549
Söderström K.-O., 461

Tabuteau F., 595
Templado C., 21
Thomas A., 113
Thomas M. G., 557, 570
Tikkala L., 137
Tso W.-W., 205, 317
Tung K. S. K., 1

Ulvik N. M., 27
Unterburger P., 467

Vale W., 158
Valivullah H. M., 196
Vassanelli P., 45
Veysiere G., 627
Vidal F., 21
Vihko R., 145
Villette J. M., 586, 595
Vreeburg J. T. M., 210

Weissenberg R., 37
Wensing C. J. G., 387
Williams J. L. 113
Winter J. S. D., 74

Zaidi P., 413
Zeilmaker G. H., 210
Zipf W. B., 185

- ACID HYDROLASES**
in rat epididymis, effect of androgens on the activity of, 345
- ACID PHOSPHATASE**
in human prostatic fluid, interrelationships with aminopeptidase, diamine oxidase, citric acid, β -glucuronidase, pH, and zinc, 503
- ACROSIN**
human and bovine, inhibition of, by divalent metal ions. Zinc as a regulator of acrosin activity, 401
- ADENYLATE CYCLASE**
desensitization of, in cell free preparations of a Leydig cell tumour, 570
LH sensitive, in plasma membranes of a Leydig cell tumour, 557
partial characterization of, and human spermatozoal phosphodiesterase and the effect of steroids on their activities, 253
- ADENYLYL CYCLASE**
Mn²⁺-dependent, in testicular germ cells, the effect of calmodulin, trifluoperazine and other psychoactive drugs on the activity of, 103
- ADP**
content of human ejaculated spermatozoa, 497, 579
- ADRENOCORTICAL CARCINOMA**
suppression of pituitary and testicular function by, in rats, 613
- AMINOPEPTIDASE**
in human prostatic fluid, interrelationships with acid phosphatase, diamine oxidase, citric acid, β -glucuronidase, pH, and zinc, 503
- ANDROGEN(S)**
effect of, on the activity of acid hydrolases in rat epididymis, 345
levels in the male rat, effects of bromocriptine-induced hypoprolactinaemia on the developmental pattern of, 437
- ANDROGEN BINDING PROTEIN (ABP)**
in experimental cryptorchidism in rat and guinea pig, 59
- ANDROGEN REPLACEMENT THERAPY**
225
- ANTIDIURETIC ACTIVITY**
the effect of copulation on the plasma, in the male rat, 52
- ANTISPERMATOGENIC ACTIVITY**
comparison of the effects of a new D-homo-steroid and testosterone in rabbits, 413
- ATP**
content of human ejaculated spermatozoa, 497, 579
- BROMOCRIPTINE**
-induced hypoprolactinaemia, the effects of, on the developmental pattern of androgen and LH levels in the male rat, 437
prolactin inhibition by, effect on testicular metabolism in the adult rat, 331
- CALMODULIN**
the effect of, on the activity of the Mn²⁺-dependent adenylyl cyclase (AC) in testicular germ cells, 103
- CARBOHYDRATE**
composition of specific rat epididymal protein, 619

CARBOHYDRATE METABOLISM

- epididymal, in experimental hypercortico-steronism in male rats, 534
- specific effect of the thyroid on testicular enzymes involved in, 196

α -CHLOROHYDRIN

- a direct effect of, on rat epididymal spermatozoa, 308

CHROMOSOMES

- meiotic, in infertile men, 113

CITRIC ACID

- in human prostatic fluid, interrelationships with acid phosphatase, aminopeptidase, diamine oxidase, β -glucuronidase, pH, and zinc, 503

COPULATION

- effect of, on the plasma antidiuretic activity of the male rat, 52

CRYPTORCHIDISM

- treatment of, 545
- unilateral experimental, in rat and guinea pig, studies on the scrotal testis in, 59

CUMULUS OOPHORUS

- of rat ova, the role of sperm-bound hyaluronidase in the dispersal of, 37

CYTOGENETIC(S)

- studies in a series of subfertile men, 113

DIAMINE OXIDASE

- in human prostatic fluid, interrelationships with acid phosphatase, aminopeptidase, citric acid, β -glucuronidase, pH, and zinc, 503

DIHYDROTESTOSTERONE

- influence of, on plasma androgen and gonadotrophin levels in normal men, 586
- influence of, on plasma steroids, sexual behaviour, and hepatic metabolism, 595
- percutaneous absorption of, in hypogonadal men, 595
- percutaneous absorption of, in normal men, 595

DISULFIDE BONDS

- nature of the proteins which form, during the maturation of rat spermatozoa, 337

ELECTRON MICROSCOPY

- classification of plastic-embedded semiferous epithelium prior to, 27

EPIDIDYMIS

- carbohydrate metabolism of, in male rats with experimental hypercortico-steronism, 534
- protein of, carbohydrate composition of, in rats, 619
- rat, effects of androgens on the activity of acid hydrolases in, 345
- rat, motility initiation of quiescent spermatozoa from, effects of pH, viscosity, osmolality and inhibitors, 425
- rat, purification of proteins 'D' and 'E', demonstration of shared immunological determinants, and identification of regional synthesis and secretion, 513

FERTILIZATION

- of hamster ova by human spermatozoa in relation to other semen parameters, 210

GERM CELLS

- effect of calmodulin, trifluoperazine and other psychoactive drugs on the activity of the Mn^{2+} -dependent adenylyl cyclase in, 103

GERM CELL TUMOURS

- in adults, current concepts in the management of, 356

β -GLUCORONIDASE

- in human prostatic fluid, interrelationships with acid phosphatase, aminopeptidase, diamine oxidase, citric acid, pH, and zinc, 503

GONADOTROPHIN RECEPTOR(S)

- diurnal variation of, in the rat testis, 137
- levels, direct inhibition of, by 2 GnRH agonists, 158

GONADOTROPHINS

circulating, correlations with testicular
LH-receptors, 145

GONORRHOEA

asymptomatic genital, semen analyses in
men with, 6

GOSSYPOL

induced anti-motility in spermatozoa, 317
inhibitor of human sperm acrosomal pro-
teinase, 636
inhibitor of lactate dehydrogenase-X, 205

GROWTH HORMONE DEFICIENCY

testicular responsiveness to human chori-
onic gonadotrophin in prepubertal
boys with, 185

GUBERNACULUM

outgrowth and regression in the dog, the
effect of orchidectomy on, 387

HUMAN CHORIONIC

GONADOTROPHIN (hCG)

combined hMG/hCG treatment in subfer-
tile men with idiopathic normogonado-
trophic oligozoospermia, 467
serum testosterone response to, by single
injection of, in the male rat, 81
testicular responsiveness to, in growth
hormone deficient prepubertal boys,
185

HYALURONIDASE

sperm bound, the role of, in the dispersal
of the cumulus oophorus surrounding
rat ova, 37

$\Delta^5\beta$ -HYDROXYSTEROID

DEHYDROGENASE

activity of, in the intact isolated rat Leydig
cells, 74

HYPERCORTICOSTERONISM

epididymal carbohydrate metabolism in
male rats with, 534

HYPOPROLACTINAEMIA

bromocriptine induced, effects of, on the
developmental pattern of androgen
and LH levels in the male rat, 437

IMPOTENCE

evaluation of, treatment of, 353

INFERTILITY, MALE

combined hMG/hCG treatment in subfer-
tile men with idiopathic normogonado-
trophic oligozoospermia, 467
cytogenetic and histological studies in a
series of subfertile males, 113
prognosis of varicocelectomy in the treat-
ment of, 452
testicular biopsy in the management of,
449

LACTATE DEHYDROGENASE-X

an isoenzyme sensitive to gossypol inhibi-
tion, 205

LEYDIG CELL(S)

in rat, determination of $\Delta^5\beta$ -hydroxy-
steroid dehydrogenase activity in, 74
in rat, effects of a chronic treatment with
testosterone on the morphology of, 130
in rat, effect of mechanical dispersing of
rat testes on the functional activity and
purification of, 191
in rat, morphology controlled by adjacent
seminiferous tubules, 325
in rat, prolactin receptors, 525

LEYDIG CELL TUMOUR

adenylate cyclase in cell free preparations
of, 570
LH sensitive adenylylase in, 557
testosterone production by, 229

LH

levels in the male rat, effects of bromo-
criptine-induced hypoprolactinaemia
on, 437
serum testosterone response to injection
of, in male rats, 81

LH-RECEPTORS

human testicular, correlations with gona-
dotrophins and testicular steroids, 145

LHRH

- effect of, on testicular function in the immature monkey, 607
- in the treatment of normogonadotrophic oligoastenozoospermia, 171
- serum testosterone response to single injection of, in male rats, 81

LYMPHOCYTE INFILTRATION

- in human testicular biopsies, 461

MEDROXYPROGESTERONE ACETATE

- spermatogenesis in men treated with injections of, combined with testosterone enanthate, 246

MEIOTIC CHROMOSOMES

- in a 14/21 translocation carrier, 21

MICROFLUOROMETRY

- assessment of sperm maturation in testicular biopsies from men with normal or reduced spermatogenesis, 11

MONKEY

- testicular function in, after LHRH administration, 607

OLIGOASTENOZOOSPERMIA

- in normogonadotrophic men, LHRH in the treatment of, 171

OLIGOZOOSPERMIA

- in normogonadotrophic men, combined hMG/hCG treatment in subfertile men with, 467

ORCHIDECTOMY

- the effect of, on gubernacular outgrowth and regression in the dog, 387
- unilateral, testicular function after, 179

PHOSPHODIESTERASE

- in human spermatozoa, effects of steroids on, 253

PITUITARY

- function in rats with transplanted adrenocortical tumour, 613

POTASSIUM LEAKAGE

- not the cause of gossypol induced anti-motility in spermatozoa, 317

PROLACTIN INHIBITION

- by bromocriptine, effect of, on testicular metabolism in the adult rat, 331

PROLACTIN RECEPTORS

- in interstitial cells of testes from rats at different stages of development, 525

PROSTATIC DISEASE

- the response of seven prostatic fluid components to, 487

PROSTATIC FLUID

- seven components, the response of, to prostatic disease, 487
- the interrelationships between acid phosphatase, aminopeptidase, diamine oxidase, citric acid, β -glucuronidase, ph, and zinc in, 503

PSYCHOACTIVE DRUGS

- the effect of, on the activity of the Mn^{2+} dependent adenylyl cyclase (AC) in testicular germ cells, 103

SEMEN

- analyses in men with asymptomatic genital gonorrhoea, 6
- parameters, fertilization of hamster ova by human spermatozoa in relation to other, 210
- volume, relation between sperm count and, and pregnancies obtained in a twenty-year follow-up period, 267

SEMINIFEROUS EPITHELIUM

- in rat, plastic embedded, classification of, 27

SEMINIFEROUS TUBULES

- local control of Leydig cells by adjacent, 325

SERTOLI CELLS

- in rat, in culture, an assessment of inhibin-like activity secreted by, 92

SOLASODINE

- antispermatogenic/antiandrogenic properties of, on the male genital tract of dog, 295

SPERM

- count, relation between semen volume and, and pregnancies obtained during a twenty-year follow-up period, 267
- maturation, microfluorometric assessment of, in testicular biopsies from men with normal or reduced spermatogenesis, 11

SPERMATOGENESIS

- assessment of, in testicular biopsies from men, 11
- initiation of, 229
- in men treated with injections of medroxyprogesterone acetate combined with testosterone enanthate, 246
- rate of, in the immature and adult mouse, 282

SPERMATOZOA

- ADP and ATP content of, in humans, 497, 579
- disulfide bonds during the maturation of, in rats, 337
- epididymal, a direct effect of α -chlorohydrin on, in rats, 308
- epididymal, quiescent, motility initiation of, in rats, 425
- fertilization of hamster ova by, in relation to other semen parameters, of humans, 210
- morphologically abnormal, relation between, and pregnancies obtained in a twenty-year follow-up period, 379
- potassium leakage during gossypol treatment in the boar, 317
- removal of zinc from subcellular regions of, by EDTA treatment, in humans, 478

STEREOLOGY

- an ultrastructural study, effects of testosterone on the morphology of the interstitial cells of the rat testis, 130

STEROID

- intratesticular and plasma profiles, in fertile and infertile men, 367
- testicular secretion, human testicular LH receptors: correlations with, 145

D-HOMO-STEROID

- the antispermatogenic effects of a new, in rabbits, 413

STEROIDOGENESIS

- testicular, direct inhibition of, by 2 potent agonists of GnRH, 158

SYNAPTONEMAL COMPLEX

- in a 14/21 translocation carrier, 21

TESTICULAR

- atrophy, in portacaval shunted rats, 45
- biopsy in the management of male infertility, 449
- biopsy, lymphocyte infiltration in, 461
- biopsy, microfluorometric assessment of sperm maturation in, 11
- development, effect of preweaning undernutrition on, in male mice, 627
- enzymes involved in carbohydrate metabolism, specific effect of the thyroid on, 196
- function after torsion, 276
- function after unilateral orchidectomy for cancer, 179
- function in rats with transplanted adrenocortical carcinoma, 613
- germ cell tumours in adults, current concepts in the management of, 356
- histology in subfertile men, 113
- LH-receptors: correlations with circulating gonadotrophins and testicular steroid secretion, 145
- metabolism in the adult rat, effect of prolactin inhibition by bromocriptine, 331
- response to LHRH administration on the immature monkey, 607
- responsiveness to hCG in growth hormone deficient pre-pubertal boys, 185

TESTIS

- function after torsion, 276
- studies on scrotal testis in unilateral experimental cryptorchid rat and guinea pig, 59

TESTOSTERONE

- chronic treatment in rats, effects on the Leydig cells, 130
- concentration in testis of boys and adults, 549
- in serum of male rats, response to a single injection of hCG, ovine-LH, and LHRH, 81
- replacement therapy, 225
- role of, in initiation of spermatogenesis, 229

TESTOSTERONE ENANTHATE

- spermatogenesis in men treated with medroxyprogesterone acetate combined with, 246

THYROID

- effect of, on testicular enzymes involved in carbohydrate metabolism, 196

TORSION

- testicular function after, 276

TRIFLUOPERAZINE

- effect of, on the activity of Mn^{2+} dependent adenylyl cyclase (AC) in testicular germ cells, 103

VARICOCELECTOMY

- prognosis of, in the treatment of infertility, 452

VASECTOMY

- sequelae of, 1

ZINC

- in human prostatic fluid, interrelationships with acid phosphatase, aminopeptidase, β -glucuronidase, diamine oxidase, citric acid, and pH, 503
- possible role of, as a regulator of acrosin activity, 401
- removal of, from subcellular regions of human spermatozoa by EDTA treatment, 478

*Andrology Unit of the Department of Dermatology¹
2nd Department of Internal Medicine Großhadern² and
Institute for Clinical Chemistry Großhadern³,
Ludwig-Maximilians University of Munich, Munich, FRG*

Combined hMG/hCG treatment in subfertile men with idiopathic normogonadotrophic oligozoospermia

By

W.-B. Schill¹, D. Jüngst², P. Unterburger² and S. Braun³

Forty-eight patients with idiopathic normogonadotrophic oligozoospermia were treated with hMG plus hCG over a period of 3 months. Total sperm output increased by an average of 15.3 million spermatozoa per ejaculate and a similar significant increase was seen in the percentage of motile spermatozoa. Sixteen of the 48 men increased their sperm output by 25 million or more. Follow-up information was available in 33 patients. Ten pregnancies were reported within one year after initiation of treatment. Six of 12 responders impregnated their wives, whereas only 4 pregnancies were reported in a group of 21 non-responders. Endocrinological investigations showed no differences in mean basal levels of LH and FSH, or in the gonadotrophin response to a 100 µg GnRH stimulation between responders and non-responders. However, mean basal plasma testosterone concentration was significantly lower in the responder group than in the non-responders. Responsiveness to gonadotrophin treatment tended to be better in patients with basal plasma testosterone concentration lower than 4.5 ng/ml. Combined hMG/hCG treatment in subfertile men with idiopathic oligozoospermia seems to be efficient in only a small proportion of cases.

Key words: gonadotrophins – hMG – hCG – therapy – oligozoospermia.

Presented at the 6th International Congress of Endocrinology, Melbourne, Australia, 10–16 February 1980.

Received on September 3rd, 1981.

Gonadotrophin replacement in males with hypogonadotrophic hypogonadism is effective in restoring fertility (Schill 1979). The use of gonadotrophins in treating subfertile men with either azoospermia or oligozoospermia and increased FSH levels is generally regarded as of no value. Controversy exists as to whether or not gonadotrophin treatment may be of benefit in normogonadotrophic oligozoospermic patients. Furthermore, no suitable selection criteria are available to predict the possible outcome of gonadotrophin treatment.

Lunenfeld et al. (1979) suggested that the gonadotrophin releasing hormone (GnRH) test was useful in selecting those patients with relative FSH deficiency who would have a better chance to respond to gonadotrophin treatment. Patients with normal basal FSH levels but exhibiting exaggerated response upon GnRH stimulation were considered inappropriate for this form of treatment.

The aim of this study was to re-evaluate the efficacy of gonadotrophin treatment in men with normogonadotrophic idiopathic oligozoospermia (sperm count less than 20 mill/ml) and to investigate whether hormonal selection criteria are available to predict gonadotrophin treatment to be successful.

Material and Methods

Forty-eight subfertile men, mean age 34.4 ± 5 years, with more than 2 years of involuntary infertility and suffering from idiopathic oligozoospermia with sperm counts consistently below 20 million per ml were selected for this study. Oligozoospermia was demonstrated in at least 3 semen analyses performed within a period of 6 months. Two of these semen analyses were performed 1 month and immediately before initiation of treatment, respectively. At least one additional semen analysis was available dating from 3 to 6 months before initiation of the trial. All patients had a negative medical history, and any medical disease possibly impairing their fertility status was excluded. Patients had testes of normal volume and consistency, no obvious epididymal abnormality was found, and they had no varicocele or signs of genital tract infection. Patients had received no treatment during the 6 months before enrolment in the study.

The female partners were checked by different gynaecologists who had performed either hysterosalpingography or pertubation or laparoscopy without detecting any significant abnormalities. A cervical, tubal or ovarian factor was not found. The females did not receive any kind of treatment during the study period of one year.

Endocrinological investigations included determination of basal concentrations of testosterone, LH and FSH, as well as the response of LH and FSH 30 min after an intravenous bolus injection of 100 μ g GnRH (Serono).

Blood samples were collected between 9 and 11 a.m. A group of 19 men with normal semen characteristics (normozoospermia) served as controls for the

hormonal investigations. Normal ranges for LH were 0.9–3.5 ng/ml, for FSH 0.9–3.5 ng/ml and for testosterone 3.0–10.0 ng/ml.

Radioimmunological measurements of LH, FSH and testosterone were performed using well established methods. Semen analysis included measurements of sperm concentration, total sperm output, total and progressive motility, sperm morphology, ejaculate volume and seminal plasma fructose (Eliasson 1971; Schirren 1982).

Semen analyses were performed one month (–1) and immediately prior to initiation of treatment (0) as well as 1, 3, and 5 (+1, +3, +5) months later.

Human gonadotrophin treatment consisted of intramuscular injection 3 times per week (Monday, Wednesday, Friday) of each 2 ampules of hMG (Pergonal 500, Serono) and twice weekly (Monday and Friday) 2500 IU hCG (Pregnesin 2500, Serono). Treatment was continued for 3 months.

Statistical analysis was performed by means of the Student's *t*-test for paired observations and the χ^2 -test. The mean of the semen analyses performed at minus 1 and 0 months before initiation of treatment served as baseline to calculate the influence of gonadotrophin treatment. Furthermore, the effect of treatment was studied in 4 subgroups according to the pre-treatment sperm count: Group A: 1 to 5 million/ml (*n* = 9), Group B: 5.1 to 10 million/ml (*n* = 12), Group C: 10.1 to 15 million/ml (*n* = 18) and Group D: 15.1 to 20 million/ml (*n* = 9).

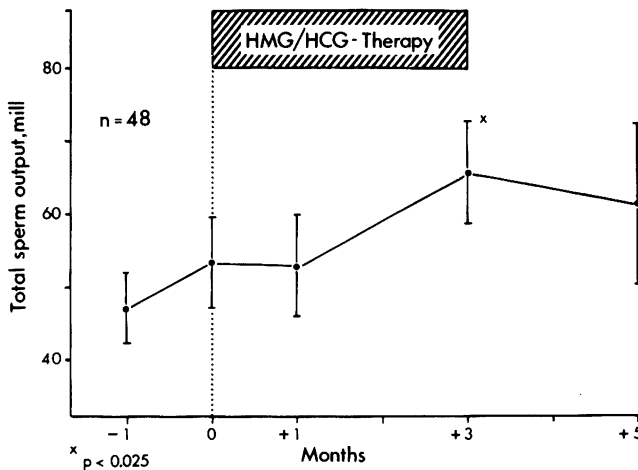


Fig. 1

Combined hMG/hCG treatment in 48 men with normogonadotrophic oligozoospermia treated over a period of 3 months with weekly 3 times 2 ampules hMG (1 ampule $\hat{=}$ 75 IU FSH + 75 IU LH) and weekly 2 times 1 ampule hCG (1 ampule $\hat{=}$ 2500 IU LH). Mean values (\pm SEM) of the total sperm output (spermatozoa/ejaculate) are plotted. Statistical calculation was done on the basis of the mean value of the 2 semen analyses performed before initiation of therapy.

Results

A. Semen parameters

1. Sperm concentration and total sperm output

Sperm counts before treatment varied between 1 and 20 million per ml with a mean of 10.9 million per ml. Mean total sperm output was 50.6 million per ejaculate. Three months after initiation of gonadotrophin treatment a significant increase ($P < 0.025$) in the mean number of spermatozoa per ejaculate was noticed. The increase averaged 15.3 million per ejaculate (Fig. 1). Two months after withdrawal of treatment the output of spermatozoa decreased without reaching the initial values.

Mean sperm concentration correspondingly increased from 10.9 million per ml to 14.9 million per ml following the treatment ($P < 0.025$). The individual response of the patients towards the treatment is shown in Fig. 2.

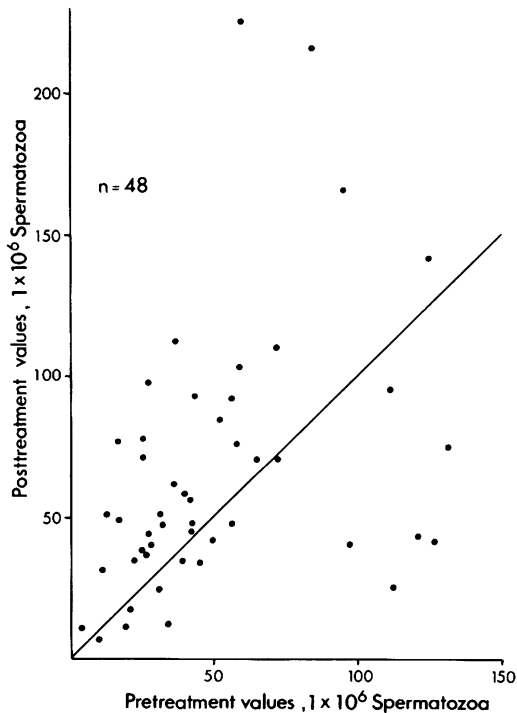


Fig. 2.

Diagram comparing the number of spermatozoa per ejaculate (total sperm output) of the same individuals immediately before treatment with those obtained 3 months after human gonadotrophin application. Points below this slope indicate a decrease, points above the slope an increase of the total sperm output.

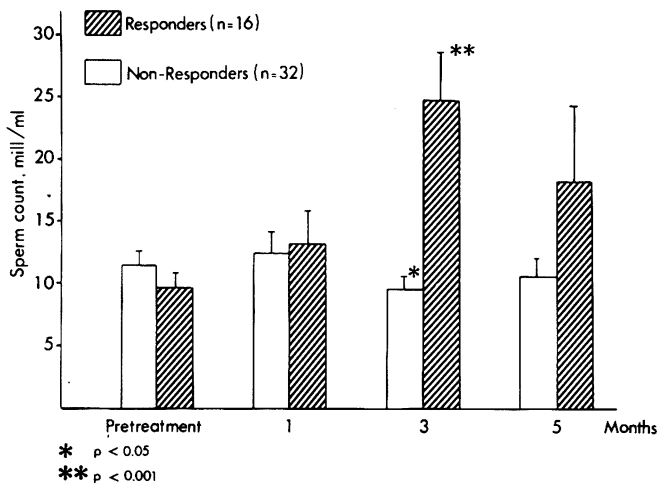


Fig. 3.

Mean sperm count (mill/ml, \pm SEM) of the responder group (n = 16) and the non-responder group (n = 32) before, during and after treatment with human gonadotrophins.

In 29 out of 48 cases (60.4%) total sperm output increased by more than 10 million spermatozoa, of these 17 cases (35.4%) showed an increase of more than 20 million spermatozoa per ejaculate, 11 men (22.9%) displayed an increase of more than 40 million spermatozoa per ejaculate, and in 6 men (12.5%) the increase exceeded 60 million spermatozoa per ejaculate. Sixteen patients in whom total output of spermatozoa was increased by at least 25 million per ejaculate were classified as responders. A comparison of the mean sperm count between responders and non-responders is shown in Fig. 3.

Patients of Groups A and C presented a significant increase in sperm count and output, whereas patients of groups B and D did not present any improvement.

2. Other semen parameters

Before treatment mean total motility equalled 31.5% and mean progressive motility 12.5%. One month after initiation of the gonadotrophin treatment a significant increase ($P < 0.01$) of the percentage of motile spermatozoa was observed. Maximum improvement was noted at the end of the treatment period (average increase 29.3%). Thereafter motility decreased without returning to the initial values.

Twenty-two patients (45.8%) displayed improvement of total motility by 50% or more. Again improvement occurred in subgroups A and C but was absent in patients of subgroups B and D. Thus most patients responding with improvement

Table 1.
Mean basal hormone levels (\pm SD) of responders, non-responders, total oligozoospermic group and a normozoospermic control group.

	FSH (ng/ml)	Δ FSH (ng/ml)	LH (ng/ml)	Δ LH (ng/ml)	Testosterone (ng/ml)
Responders (n=16)	1.77 \pm 0.66	1.48 \pm 1.21	1.91 \pm 1.01	8.53 \pm 5.13	4.13 \pm 1.57*
Non-responders (n=32)	1.73 \pm 0.56	1.31 \pm 0.98	1.94 \pm 1.13	7.28 \pm 4.17	5.20 \pm 2.38*
Total group (n=48)	1.74 \pm 0.59	1.36 \pm 1.05	1.93 \pm 1.04	7.70 \pm 4.50	4.84 \pm 1.71
Control group (n=19)	2.00 \pm 0.69	1.09 \pm 0.68	1.97 \pm 0.69	6.31 \pm 2.76	4.32 \pm 1.37

*Difference between both groups is statistically significant ($p < 0.025$).

Table 2.

Basal testosterone levels and responsiveness to gonadotrophin therapy.

Basal testosterone	< 4.5 ng/ml	> 4.5 ng/ml
No. of patients	24	24
Responsive to therapy	12 (50%)*	4 (17%)
Non-responsive to therapy	12(50%)	20 (83%)

* $P < 0.025$.

of sperm motility also showed increased sperm concentrations. Progressive sperm motility, however, remained unchanged.

Morphology of the spermatozoa remained unchanged during treatment; the percentage of normally shaped spermatozoa, however, decreased two months after withdrawal of the medication ($P < 0.025$).

Ejaculate volume was not affected, the concentration of fructose in seminal plasma displayed a small, but significant decrease after one month of gonadotrophin treatment ($P < 0.025$), but was restored to normal after 3 and 5 months.

3. Conception rates

Follow-up information is available from 33 out of 48 patients. Ten pregnancies were reported within one year after initiation of treatment. Of these 2 ended in abortion. The overall conception rate thus equals 30%; 80% of the pregnancies occurred within the first 6 months after initiation of treatment with maximal incidence around the 4th and 5th month. Six out of 12 responders impregnated their wives whereas only 4 out of 21 non-responders reported pregnancy. The difference between both groups, however, does not reach statistical significance.

Distribution of conceptions within the different subgroups was as follows: conception occurred in 4 out of 7 wives of Group A patients, 1 out of 7 wives of Group B patients, 5 out of 12 wives of Group C patients and none in group D patients.

There seems to be a tendency towards more conceptions in those subgroups who showed an improvement of the semen parameters following gonadotrophin treatment, however, the number of pregnancies was too small to draw any conclusions.

B. Hormone parameters and responsiveness to gonadotrophin therapy

In order to solve the question whether any hormonal selection criteria would be available to predict the success of gonadotrophin therapy, endocrinological para-

Table 3.

Gonadotrophin levels (basal and after GnRH) and responsiveness to gonadotrophin therapy.

	Basal levels of					
	FSH		LH		LH/FSH ratio	
	≤ 2 ng/ml	> 2 ng/ml	≤ 2 ng/ml	> 2 ng/ml	≤ 1 ng/ml	> 1 ng/ml
No. of patients	31	17	28	20	21	27
Responsive to therapy	9 (29%)	7 (41%)	9 (32%)	7 (35%)	7 (33%)	9 (33%)
Non-responsive to therapy	22 (71%)	10 (59%)	19 (68%)	13 (65%)	14 (67%)	18 (67%)

Gonadotrophin increase after GnRH	FSH		LH	
	≤ 50%	> 50%	≤ 500%	> 500%
No. of patients	19	29	35	13
Responsive to therapy	7 (37%)	9 (31%)	12 (34%)	4 (31%)
Non-responsive to therapy	12 (63%)	20 (69%)	23 (66%)	9 (69%)

meters were compared in patients and normal controls (Table 1). No differences were found on basal levels of FSH and LH and testosterone between the 48 oligozoospermic men and the control group of 19 normozoospermic patients. Furthermore, no difference occurred in basal FSH and LH levels as well as in GnRH response between responders and non-responders. Mean basal levels of testosterone, however, were significantly lower in the responder group ($P < 0.025$). Patients having a basal testosterone level below 4.5 ng/ml tended to respond better to gonadotrophin treatment than those with higher basal testosterone levels (Table 2). In contrast, patients with basal FSH and LH levels below 2.0 ng/ml showed no

Table 4.

Hormone values of men who impregnated their wives after gonadotrophin therapy.

ng/ml ($X \pm SD$)	FSH	Δ FSH	LH	Δ LH	Testosterone
Fathers (n=10)	1.76 ± 0.64	1.75 ± 1.41	1.85 ± 1.02	9.46 ± 4.89	4.75 ± 1.42
Non-Fathers (n=38)	1.73 ± 0.58	1.26 ± 0.93	1.82 ± 1.13	7.23 ± 4.33	4.63 ± 2.08

better response to gonadotrophin treatment than those with higher FSH or LH levels (Table 3). The LH/FSH ratio was equal in the group of the responders (1.2) and the non-responders (1.19).

Finally no differences were found in the hormonal assessment of men who impregnated their wives as compared to those who did not (Table 4).

Discussion

Our data confirmed the reports of others (Paulsen et al. 1970; Da Rugna et al. 1974; Glezerman & Lunenfeld 1976; Rosemberg 1976; Schreiber 1977; Lunenfeld et al. 1979; Schellen & Bruine 1980) in demonstrating some effect of the combined gonadotrophin treatment in patients with normogonadotrophic idiopathic oligozoospermia. However, to prove the efficacy of this treatment, a controlled trial would be necessary. Whereas increased sperm concentration generally occurred at the end of the 3 months' treatment period, some patients, however, only increased their sperm count at 5 months after initiation of treatment. In other cases the sperm count already dropped 2 months after interruption of treatment. Considering the effects of treatment depending on the pre-treatment sperm count, subgroup A, B, C and D responded at random indicating that the initial sperm count did not influence the gonadotrophin response and did not allow prediction of response.

Improvement of total sperm motility occurred already one month after initiation of treatment and tended to persist 2 months after withdrawal of medication. Improvement of sperm motility generally occurred in the same patients also presenting increase in sperm concentration. Improvement of sperm motility seems to be more closely related to the fertility status of the patient than an increase of the number of spermatozoa (Ulstein 1973; David et al. 1980). This finding could be of importance. The significance of the temporary decrease in semen fructose and post-treatment decrease in the percentage of normally shaped spermatozoa remains questionable.

In comparisons with other authors (Lunenfeld & Insler 1978) the conception rate found in our study (30%) is rather high, it is, however, comparable to other forms of treatment evaluated in our patient material (Schill 1979, 1982b).

The conception rate in the non-responder group (19%) is similar to the spontaneous conception rate in our patient material, being 16% (Schill 1977).

The higher conception rate in responders (50%) tends to support the idea that treatment has favourably influenced the fertility status of these cases.

Our search for selection criteria to predict the effectiveness of gonadotrophin treatment was unsuccessful. The only prognostic hint concerns the basal testosterone level being significantly lower in the responder than in the non-responder group. This finding agrees with the observations of Lunenfeld et al. (1979).

Individual prediction of treatment outcome, however, reveals impossible.

In conclusion combined hMG/hCG treatment in men with normogonadotrophic idiopathic oligozoospermia should be considered an empirical form of therapy. The results obtained are poor in terms of improved semen parameters compared to those reported for other treatments e.g. anti-oestrogens or kallikrein (Schill 1982a). Nevertheless, conception rate was found above that observed during placebo treatment, which in our patient material is between 10 and 20% (Schill 1977, 1982b).

However, considering the relative small number of responders and the high cost of human gonadotrophins, this mode of treatment should not be considered a significant progress in the management of idiopathic oligozoospermia.

Acknowledgments

The careful technical assistance of Mrs. E. Schön-Roming and Mrs. I. Walter is acknowledged.

Pergonal 500 and Pregnesin 2500 were in part provided by Serono, Inc., Freiburg, Germany.

References

- Da Rugna D, Dedes M & Ghossein E (1974): Erfahrungen mit Humangonadotropinen bei Fertilitätsstörungen des Mannes. *Schweiz Rundschau Med Praxis* 63: 699.
- David M P, Amit A, Bergman A, Yedwab G, Paz G F & Homannai Z T (1979): Sperm penetration in vitro: Correlation between parameters of sperm quality and the penetration capacity. *Fertil Steril* 32: 676.
- Eliasson R (1971): Standards for investigation of human semen. *Andrologia* 3: 49.
- Glezerman M & Lunenfeld B (1976): Hormontherapie männlicher Fertilitätsstörungen. In: Kaden R, Lübke F & Schirren C (eds). *Fortschritte der Fertilitätsforschung III*, p 17–22, Grosse, Berlin.
- Lunenfeld B & Insler V (1978): Infertility. *Diagnosis and Treatment of Functional Infertility*. Grosse, Berlin.
- Lunenfeld B, Olchovsky D, Tadir Y & Glezerman M (1979): Treatment of male infertility with human gonadotropins: Selection of cases, management and results. *Andrologia* 11: 331.
- Paulsen C A, Espeland D H & Michals E L (1970): Effects of HCG, HLH and HGH administration on testicular function. In: Rosemberg E & Paulsen C A (eds). *Human Testis*, p 547–562. Plenum Press, New York.
- Rosemberg E (1976): Gonadotropin therapy of male infertility. In: Hafez E S E (ed). *Human Semen and Fertility Regulation in Men*, p 464–475. Mosby Comp, St. Louis.
- Schellen T M C M & Bruinse H W (1980): Evaluation of the treatment with gonadotropic hormones in cases of severe and moderate oligozoospermia. *Andrologia* 12: 174.
- Schill W-B (1977): Kallikrein as a therapeutic means in the treatment of male infertility. In: Haberland G L, Rohen J W & Suzuki T (eds). *Kininogenases. Kallikrein 4*, p 251–280. Schattauer, Stuttgart, New York.

- Schill W-B (1979): Recent progress in pharmacological therapy of male subfertility – a review. *Andrologia* 11: 77.
- Schill W-B (1982a): Medical treatment of idiopathic normogonadotropic oligozoospermia. *Int J Androl Suppl* 5: 135.
- Schill W-B (1982b): Recent advances in the medical treatment of male fertility disturbances. *Germ Hautarzt*, in press.
- Schirren C (1982): *Praktische Andrologie*. Karger, Berlin.
- Schreiber G (1977): Ergebnisse der kombinierten Gonadotropintherapie bei Subfertilität des Mannes. *Derm Monatschr* 163: 88.
- Ulstein M (1973): Fertility of donors at heterologous insemination. *Acta Obstet Gynaec Scand* 52: 97.

Authors' addresses:

- W.-B. Schill, Andrology Unit of the Department of Dermatology,
University of Munich, Frauenlobstr. 9–11, D-8000 München 2, FRG.
- D. Jüngst und P. Unterburger, Second Department of Internal Medicine Großhadern,
University of Munich, Marchioninstr. 15, D-8000 München 70, FRG.
- S. Braun, Institute for Clinical Chemistry, Großhadern,
University of Munich, Marchioninstr. 15, D-8000 München 70, FRG.