ISSN : 0974 - 7435 Volume 10 Issue 3

BioTechnology
An Indian Journal

FULL PAPER

BTAIJ, 10(3), 2014 [685-690]

Research hotspots analysis of estradiol by pubmed

Hou Jinjie[1], He Jundong[2], Wang Xiumin[2], Zhang Bin[2], Liu Yuhong[1], Liu Yang[1], Jia Yufeng[1], Li Lin[1], Yang Qiuxia[1], Guo Yunling[1]*

[1]Second Affiliated Hospital, Xingtai Medical College, 054000, Xingtai, Hebei, (CHINA)

[2]Xingtai University, 054000, Xingtai, Hebei, (CHINA)

E-mail: wein871@sohu.com

ABSTRACT

Objective: To understand the research hotspots of estradiol by PubMed. **Methods**: With MS Excel, SPSS, Cytoscape software, we took MeSH (Medical Subject Headings) word frequency analysis, clustering analysis, co-word network graph of PubMed papers. **Results**: It shows that the current estradiol research hotspots had focus on "Progesterone; Testosterone; Breast Neoplasms; Estrogen Receptor alpha; Postmenopause", etc, it also suggests that the most top 2 importance of which was Progesterone and Estrogen Receptor alpha. **Conclusion**: It is helpful and timesaving for researcher or doctor to understand the research hotspots in estradiol.

KEYWORDS

Estradiol;
Word frequency analysis;
Clustering analysis;
Co-word network graph;
Progesterone;
Estrogen receptor alpha.

INTRODUCTION

Estradiol is a kind of natural estrogen mainly secreted by mature ovarian follicle, it can promote and regulate women's genitals and normal development of secondary sex characteristics. Clinic used it in ovarian insufficiency or ovarian hormone deficiency, for example functional metrorrhagia, primary amenorrhea, menopause syndrome, prostate cancer, etc[6], so the estradiol are indispensable for women. We hope that through this study the analysis of the subject headings can be drawn the outline of research hotspot about estradiol nearly five years.

Therefore this research retrieved the estradiol papers of PubMed (http://www.ncbi.nlm.nih.gov/pubmed), got 7787 papers nearly five years, and analyzed MeSH of above papers using Co-word Analysis[7].

MATERIALS AND METHODS

First, we retrieved PubMed papers with the default publication dates On April 1, 2014. Second, search terms was "Estradiol"[Mesh] AND ("2009/04/03"[PDat] : "2014/04/01"[PDat]); Third, using Microsoft Excel we recorded All Major Topic MeSH (Majr terms) of above papers, and sort and filter the terms, and looked for the high frequency terms (occurrences), and we also counted occurrences of two high frequency terms together in the same paper, setting up the original co-word matrix. Fourth, the statistical analysis: we made Majr term's clustering analysis using SPSS13.0 statistical software, draw the co-word network graph of the high frequency terms using Cytoscape software[5].

MAJR TERMS ANALYSIS OF PAPERS

FULL PAPER

ABOUT ESTRADIOL

Majr terms word frequency analysis: We retrieved 7787 papers, all with MeSH terms, we extracted Majr terms and established the Majr terms database. We got 36 Majr terms of estradiol which occurrences fre-

TABLE 1 : The top 36 Majr terms about estradiol

Ranking	MeSH terms	Occurrences frequency (times)	Percentage (%)	Cumulative Percent (%)
1	Estradiol	3638	10.0737	10.0737
2	Estrogens	914	2.5309	12.6045
3	Estrogen Receptor alpha	569	1.5756	14.1801
4	Breast Neoplasms	538	1.4897	15.6698
5	Progesterone	471	1.3042	16.9740
6	Testosterone	404	1.1187	18.0927
7	Ovary	286	0.7919	18.8846
8	Ovarian Follicle	272	0.7532	19.6378
9	Postmenopause	249	0.6895	20.3273
10	Receptors, Estrogen	245	0.6784	21.0057
11	Estrogen Receptor beta	220	0.6092	21.6149
12	Gonadal Steroid Hormones	219	0.6064	22.2213
13	Estrogen Replacement Therapy	209	0.5787	22.8000
14	Gonadotropin-Releasing Hormone	202	0.5593	23.3594
15	Water Pollutants, Chemical	199	0.5510	23.9104
16	Neurons	194	0.5372	24.4476
17	Signal Transduction	191	0.5289	24.9765
18	Endocrine Disruptors	189	0.5233	25.4998
19	Follicle Stimulating Hormone	177	0.4901	25.9899
20	Gene Expression Regulation	176	0.4873	26.4773
21	Endometrium	167	0.4624	26.9397
22	Luteinizing Hormone	162	0.4486	27.3883
23	Ovulation Induction	157	0.4347	27.8230
24	Aging	152	0.4209	28.2439
25	Cattle	144	0.3987	28.6426
26	Apoptosis	143	0.3960	29.0386
27	Uterus	141	0.3904	29.4290
28	Brain	140	0.3877	29.8167
29	Reproduction	130	0.3600	30.1767
30	Ovariectomy	127	0.3517	30.5283
31	Cell Proliferation	123	0.3406	30.8689
32	Phenols	122	0.3378	31.2067
33	Estrous Cycle	120	0.3323	31.5390
34	Menstrual Cycle	119	0.3295	31.8685
35	Prostatic Neoplasms	116	0.3212	32.1897
36	Aromatase	114	0.3157	32.5054

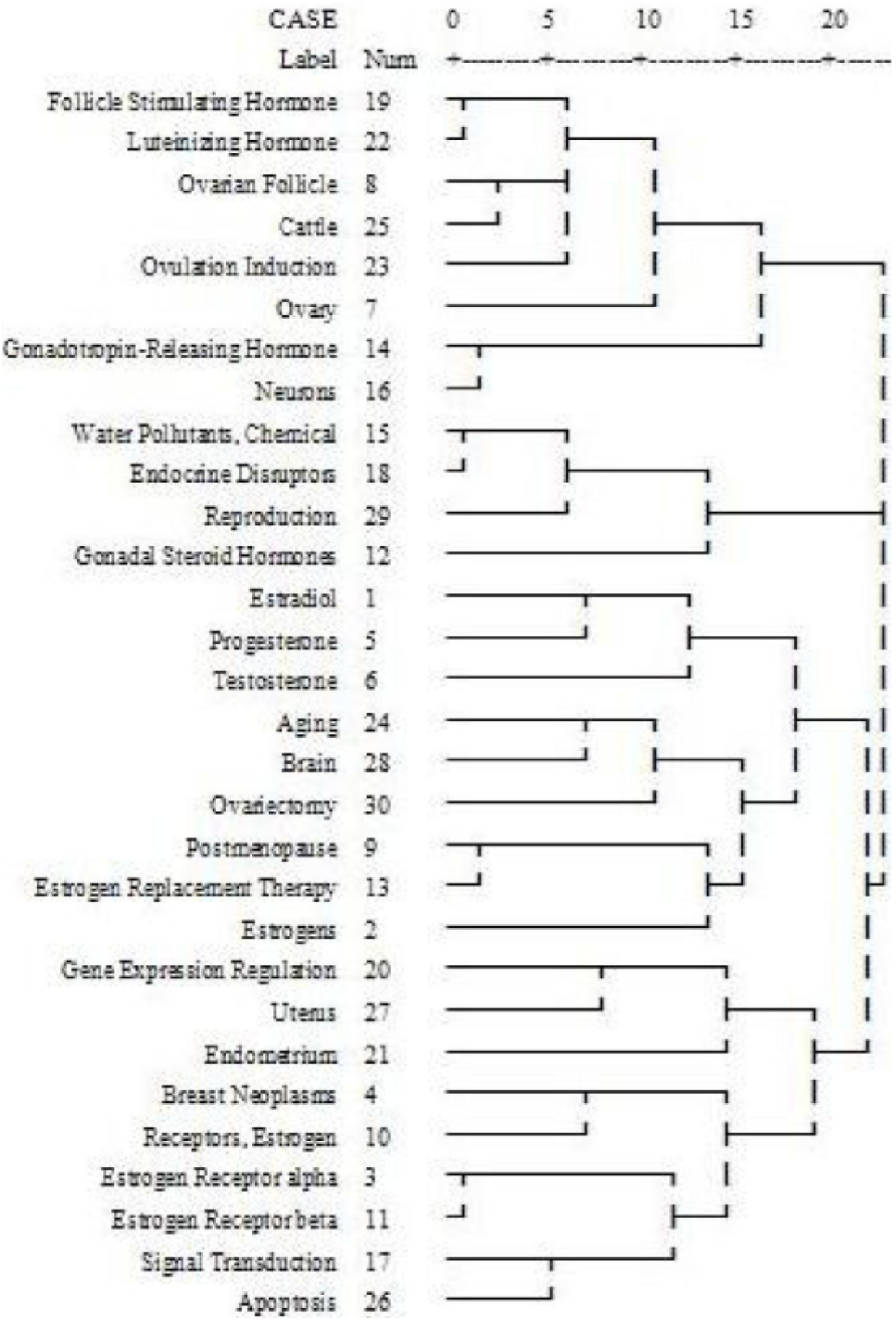

Figure 1 : Hierarchical clustering analysis dendrogram of Majr terms

quency was over 114. From TABLE 1, we can infered some ideas: the relevant research hotspots of estradiol mainly concentrated in the "Estrogen Receptor alpha; Breast Neoplasms; Progesterone; Testosterone", etc, it also suggests that Estrogen Receptor alpha has become most major research hotspots. Clustering analysis of the high frequency Majr terms: This research used hierarchical clustering analysis which is one of the most commonly used Classify analysis to analyze the top 30 Majr terms which occurrences frequency was over 127 times), drew a dendrogram, and the results were shown in Figure 1.

From the Figure 1, except individual Majr term as " Cattle; Brain; ", we could seen the other high fre-

FULL PAPER

TABLE 2 : The top 16 Majr terms pair

Ranking	MeSH terms A	MeSH terms B	Co-word occurrences frequency (times)
1	Estradiol	Estrogens	501
2	Estradiol	Progesterone	372
3	Estradiol	Testosterone	293
4	Estradiol	Breast Neoplasms	262
5	Estradiol	Estrogen Receptor alpha	237
6	Estradiol	Postmenopause	137
7	Estrogen Receptor alpha	Estrogen Receptor beta	128
8	Estradiol	Estrogen Replacement Therapy	121
9	Estradiol	Receptors, Estrogen	112
10	Estrogen Receptor alpha	Breast Neoplasms	102
11	Estradiol	Estrogen Receptor beta	86
12	Estradiol	Ovary	77
13	Estrogens	Estrogen Receptor alpha	71
14	Estradiol	Gonadotropin-Releasing Hormone	69
15	Estrogens	Breast Neoplasms	67
16	Estradiol	Ovarian Follicle	62

quency Majr terms could be divided into the following six groups. Group 1 contains Majr terms ("Follicle Stimulating Hormone; Luteinizing Hormone; Ovarian Follicle; Ovulation Induction; Ovary; Gonadotropin-Releasing Hormone; Neurons"), it suggests that neural hormone secreted by hypothalamic neurons (such as gonadotropin-releasing hormone) and peptide hormone (included follicle stimulating hormone and luteinizing hormone) both has the effect of ovulation induction to the ovary[8]. Group 2 contains Majr terms ("Water Pollutants, Chemical; Endocrine Disruptors; Reproduction; Gonadal Steroid Hormones"), it suggests that endocrine disruptors including chemical water pollutants, estradiol and so on, affect the gonadal steroid hormone secretion of reproductive system, cause male feminization, testicular tumor, endometriosis, teratogenic, etc[2]. Group 3 contains Majr terms ("Estradiol; Progesterone; Testosterone"), it suggests that abnormalities of estradiol, progesterone, testosterone and other hormonal will cause the female's ovulation disorders, or ovulation failure, it will cause unpregnancy[4]. Group 4 contains Majr terms ("Aging; Ovariectomy; Postmenopause; Estrogen Replacement Therapy; Estrogens"), it suggests that one of aging problem such as the women after menopause or after ovaries resection, it will be lack of estrogen and will bring on related problems, this problems above need to solve by estrogen replacement therapy[1]. Group 5 contains Majr terms ("Gene Expression Regulation; Uterus; Endometrium"), it suggests that in recent years by gene chip technology, the high-throughput screening studies of endometrium related genes receptivity was launched, it is helpful to find endometriosis and understand the cause of the uterus implant failure, assess endometrial function and predict pregnancy outcome, it will play an important role[3]. Group 6 contains Majr terms ("Breast Neoplasms; Receptors, Estrogen; Estrogen Receptor alpha; Estrogen Receptor beta; Signal Transduction; Apoptosis"), it suggests that excessive estrogen stimulation can induce breast tumor, its mechanism involve estrogen receptors, signal transduction, apoptosis, etc[9].

The above clustering results suggest that several Majr terms within one group have certain inherent logic connection between eachother; If there are no known correlation between the Majr terms, it indicates we find a new research hotspot.

Co-word network graph of the high frequency Majr terms pair

By analyzing the top 14 Majr terms which word

FULL PAPER

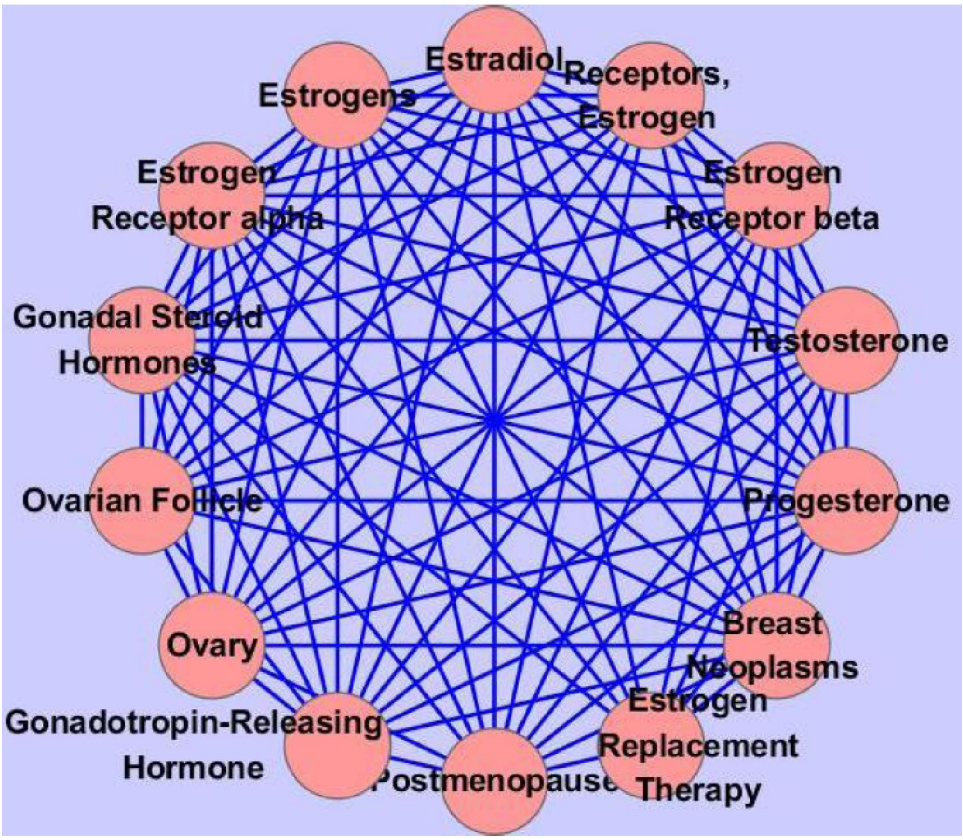

Figure 2 : Co-word network graph of the high frequency Majr terms pair

frequency were over 202 times, we got the top 16 Majr terms pair (A and B, see TABLE 2) and co-word network graph of the Majr terms pair (see Figure 2). Especially the second Majr terms pair of "Estradiol" and "Progesterone" appeared 372 times in the same paper, it was far higher than that of the third MeSH terms pair (293 times, "Estradiol" and "Testosterone").

In Figure 2 the edge represents the concurrence relationship between Majr terms pair and if the edge between one Majr term to other Majr term, it suggests that the one Majr term is more important, it is in the center of the research hotspots. So we could infer that the current estradiol research hotspots had focus on "Progesterone; Testosterone; Breast Neoplasms ; Estrogen Receptor alpha; Postmenopause", etc, it also suggests that "Progesterone" is the research hotspots of estradiol now.

CONCLUDING REMARKS

By analyzing MeSH terms (word frequency analysis, clustering analysis, co-word network graph) of PubMed papers about estradiol, we could infer that the current estradiol research hotspots had focus on "Progesterone; Testosterone; Breast Neoplasms ; Estrogen Receptor alpha; Postmenopause", etc, it also suggests that the most top 2 importance of which was Progesterone and Estrogen Receptor alpha.

REFERENCES

[1] D.Bădoi, E.Crauciuc, L.Rusu, V.Luca; Therapy with climara in surgical menopause. Rev.Med.Chir.Soc. Med.Nat.Iasi, **116(3)**, 828-833 **(2012)**.

[2] R.Chaube, G.J.Gautam, K.P.Joy; Teratogenic effects of 4-nonylphenol on early embryonic and larval development of the catfish Heteropneustes fossilis. Arch.Environ.Contam.Toxicol., **64(4)**, 554-561 **(2013)**.

[3] M.Fambrini, F.Sorbi, C.Bussani, R.Cioni, G.Sisti, K.L.Andersson; Hypermethylation of HOXA10 gene in mid-luteal endometrium from women with ovarian endometriomas. Acta Obstet Gynecol Scand, **92(11)**, 1331-1334 **(2013)**.

[4] Y.M.Liao, M.I.Hsu, C.S.Hsu, C.T.Lee, K.Chen; Endometrial thickness in women with ovulatory dysfunction. Gynecol Endocrinol, **29(4)**, 315-318

(2013).

[5] M.E.Smoot, K.Ono, J.Ruscheinski, P.L.Wang, T.Ideker; Cytoscape 2.8: new features for data integration and network visualization. Bioinformatics, **27(3)**, 431-432 **(2011)**.

[6] A.Z.Steiner, M.Xiang, W.J.Mack, D.Shoupe, J.C.Felix, R.A.Lobo, H.N.Hodis; Unopposed estradiol therapy in postmenopausal women: Results from two randomized trials. Obstet Gynecol, **109(3)**, 581-587 **(2007)**.

[7] M.I.Viedma-Del-Jesus, P.Perakakis, M.Á.Muñoz, A.G.López-Herrera, J.Vila; Sketching the first 45 years of the journal Psychophysiology (1964-2008): A co-word-based analysis. Psychophysiology, **48(8)**, 1029-1036 **(2011)**.

[8] G.Yazici, A.Savas, B.Tasdelen, S.Dilek; Role of luteal phase support on gonadotropin ovulation induction cycles in patients with polycystic ovary syndrome. J.Reprod.Med., **59(1-2)**, 25-30 **(2014)**.

[9] W.Zhou, J.M.Slingerland; Links between oestrogen receptor activation and proteolysis: Relevance to hormone-regulated cancer therapy. Nat.Rev.Cancer, **14(1)**, 26-38 **(2014)**. Review. Erratum in: Nat.Rev.Cancer. **14(2)**, 146, Feb **(2014)**.