**Scholars Journal of Applied Medical Sciences (SJAMS)**
***Abbreviated Key Title: Sch. J. App. Med. Sci.***
**ISSN 2320-6691 (Online)**
**ISSN 2347-954X (Print)**

A Unit of Scholars Academic and Scientific Society, India
www.saspublishers.com

Paediatrics

# Nonseminomatous Germ Cell Tumors of Testis in Children

**Mounir Kisra*, Driss Hanine, Achraf El Bakkaly, Aziz Zaoui, Rachid Oulahyane**
Service de chirurgie viscérale pédiatrique A, hôpital d'enfants, centre hospitalier Ibn Sina, faculté de Médecine Mohammed V, BP 6527, rue Lamfadel Cherkaoui Rabat Institut, Rabat, Marocco

**Original Research Article**

***Corresponding author**
*Mounir Kisra*

**Article History**
*Received: 12.10.2018*
*Accepted: 22.10.2018*
*Published: 30.10.2018*

**DOI:**
10.36347/sjams.2018.v06i10.070

**Abstract:** Testicular tumors are rare in children and different from those of adults concerning both histopathological features and Clinique behavior. We report our experience to sensitize practitioners about the importance of good care diagnosis and treatment of these tumors. A retrospective study between January 2000 and December 2010 of 13 cases of testicular nonseminomatous germ cell tumors. We report their clinical, histopathological, and therapeutic characteristics with their evolution with a litterature review. A total of 37 testicular tumors were identified of which thirteen cases were nonseminomatous germ cell tumors. The average age at diagnosis was 25 months. Among these tumors, nine (69.2%) were yolk sac tumors, two (15.4%) were teratoma and 2 others embryonic carcinoma. The most common clinical presentation was that of a painless scrotal mass or swelling. Ten tumors were treated by inguinal orchiectomy and one by transscrotal orchiectomy. Eleven patients underwent cisplatin based chemotherapy. Three discontinued treatment and nine others were in remission. Up till now, three patients are still being followed with a drop of 5 to 10 years. Testicular tumors in children, although rare, they deserve special attention both on the diagnostic level, and the therapeutic one. Any solid scrotal mass should be considered malignant until proven otherwise and requires inguinal exploration. Testicular sparing surgery should be performed in cases of benign lesion.
**Keywords:** children; nonseminomatous germ cell tumor; orchiectomy.

## INTRODUCTION

Testicular tumors in children are rare and represent 1% of all pediatric solid tumors with an annual incidence of 0.5 to 2 per 100,000 boys [1]. They are mainly subdivided into 2 groups: germinal and non-germinal tumors [2]. Non-seminomatous tumors are the most common with yolk sac (> 60%) and teratomas (25%) predominating [3].

They can occur at any age with two peaks before age 3 and after puberty [2]. The median age for onset of yolk sac tumors is 16 months and 13 months for teratoma. Mortality rates are low, with a death rate of 10 million per year, and survival for pre-pubertal testicular cancer of about 99% at 5 years [4]. And while these tumors were often treated like those of adults, several reports have noted that these tumors are distinct from those of adults in both clinical and biological terms [3].

In addition, some recent studies have noted that benign lesions accounted for a higher percentage than malignant lesions with a predominance of germ-tumors [5]. As a result, the treatment of testicular tumors of the child becomes different from those of the adult with a significant role of partial orchiectomy for the treatment of benign tumors [6].

We report our experience in the management of non-seminomatous germ cell tumors in children by describing their epidemiological and histological profile in order to sensitize practitioners to the proper diagnostic and therapeutic management of these tumors.

## MATERIALS & METHODS

We conducted a retrospective study of the clinical data of patients with testicular tumors followed in the Pediatric Surgery A department and the pediatric oncology unit of Rabat Children's Hospital between January 2000 and December 2010. The criteria of inclusion were patients aged less than 15 years with a non-seminomatous germ cell tumor of the testis. While patients with non-germinal tumor of the testis or seminoma were excluded from the study.

Clinical data for age, clinical presentation, serum markers (alphafoetoprotein and βHCG), imaging results, treatment and follow-up were collected. The histological study was performed by an experienced

pathologist and the stage of the disease was determined according to the TNM-SFOP classification.

Close follow-up was performed in all patients with malignant tumor of the testis. Patients had regular thoracoabdominopelvic CT scan, scrotal ultrasound, and serum marker assay.

## RESULTS

Between January 2000 and December 2010, a total of 37 children with testicular tumors were treated in our institution, including 13 cases of non-seminomatous germ tumors. Children with nonseminomatous germ cell tumors were 12 months to 6 years old, with an average age of 25 months (Figure 1).

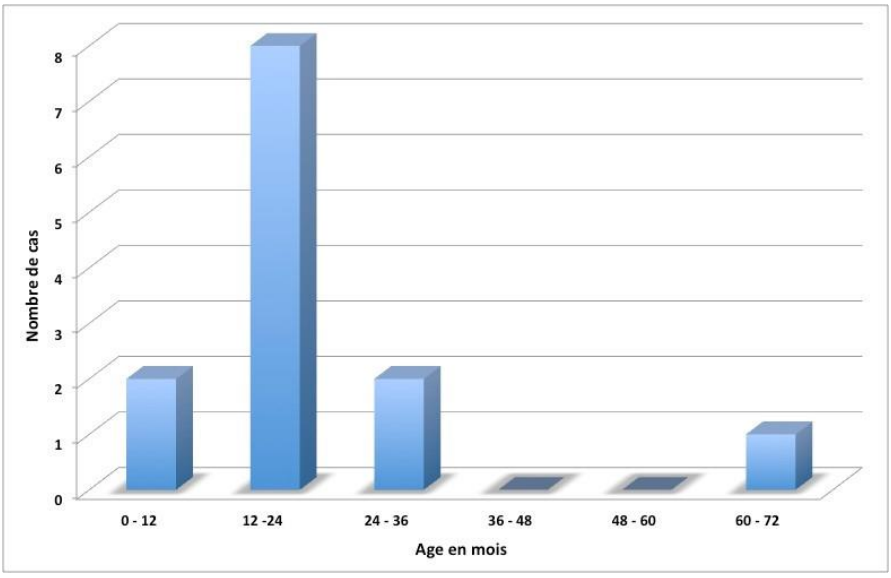


**Fig-1: Graph showing the distribution of patients according to age**

Medical history included hydrocele, testicular biopsy in three patients, inbreeding in two others, and familial cancer in three patients. The time to consultation ranged from 15 days to 20 months with an average delay of 4½ months. The most common symptom found was a large purse with a predominance of the right side.

The clinical examination found a large bursa in all children with local inflammatory signs in 2 of them. Ultrasonography performed in all patients revealed a heterogeneous hypoechoic tissue mass ranging in size from 28 to 86 mm, central necrosis was present in 2 patients with the presence of intra-testicular calcifications in 4 others (Figure 2).

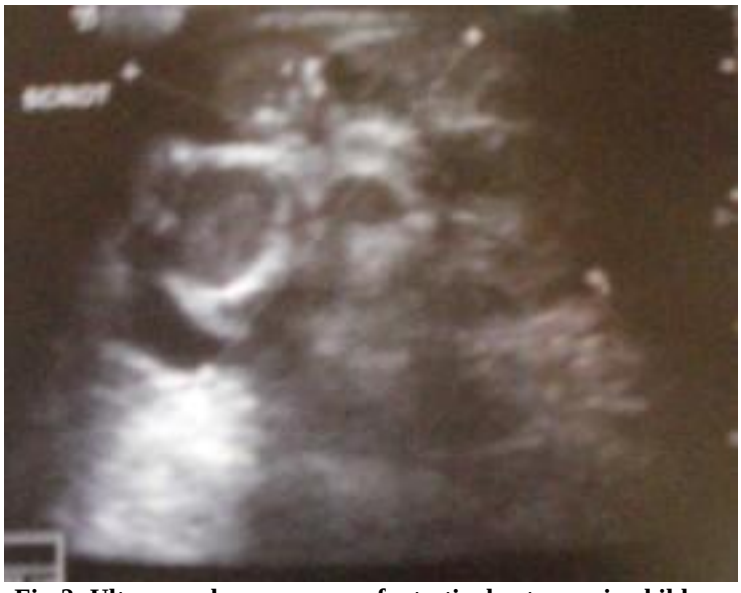

**Fig-2: Ultrasound appearance of a testicular tumor in children**

The CT scan performed in 9 patients showed retro-peritoneal lymphadenopathy in two of them. Finally, MRI was performed in one child in whom the ultrasound was inconclusive (Figure 3). Alphafoetoprotein (AFP) dosed in 11 patients returned positive in 10 of them (77%) with a rate greater than 15000ng / ml in 2 patients (15.4%) (high risk). Whereas βHCG returned negative in the 9 patients in whom it was dosed.

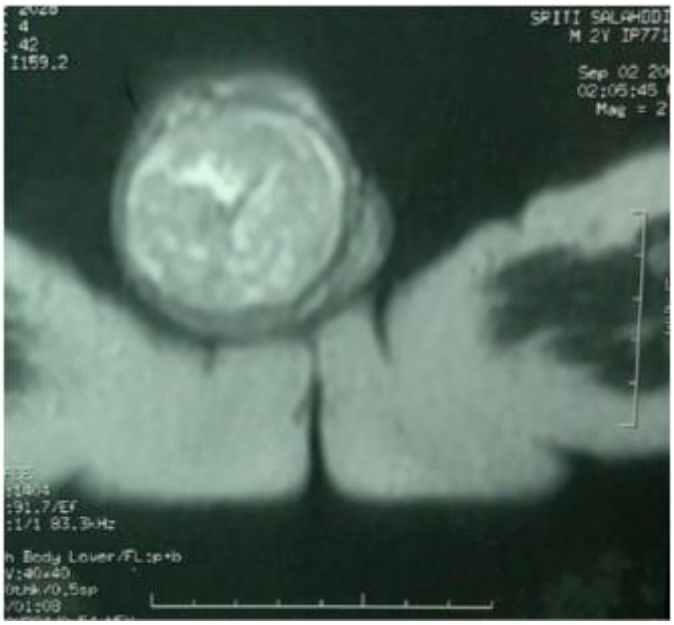

**Fig-3: Magnetic resonance imaging (MRI) appearance of a testicular tumor**

Inguinal orchiectomy with ring ligation was performed in 10 patients (77%) while one patient underwent scrotal orchiectomy (Figure 4). Yolk sac tumor was the most common histological type with 9 cases (69.2%) followed by teratoma with 2 cases (15.4%) and embryonic carcinoma with 2 others. Patients were classified into 2 groups, 2 high-risk patients and 7 standard risk patients then treated according to the TGM95 protocol.

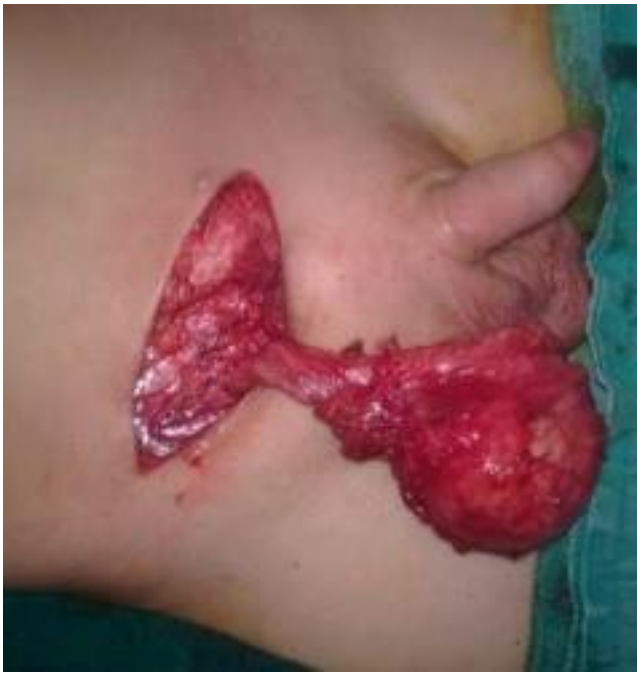

**Fig-4: Intraoperative appearance during inguinal orchiectomy**

For high risk, chemotherapy was a VIP treatment using iphosphomide (3g / m2 / day; j1 and j2), etoposide (75mg / m2 / day; j1j5) and cisplatin (20mg / m2 / day). j1◊j5), whereas for the standard risk

chemotherapy was a VBP treatment using vinblastine (3 mg / m2 / day; j1 and j2), bleomycin (15 mg / m2 / day, day 1 and day 2) and cisplatin (100mg / m2 / day; j3) with a total of 2 to 6 courses.

A total of 11 patients received cisplatin-based chemotherapy, of whom 3 had preoperative chemotherapy (biopsy diagnosis). Both cases of teratoma did not have chemotherapy. The three patients who had first chemotherapy, two dropped out and did not have orchiectomy. The retroperitoneal lymphadenopathies found initially in imaging have completely regressed after chemotherapy.

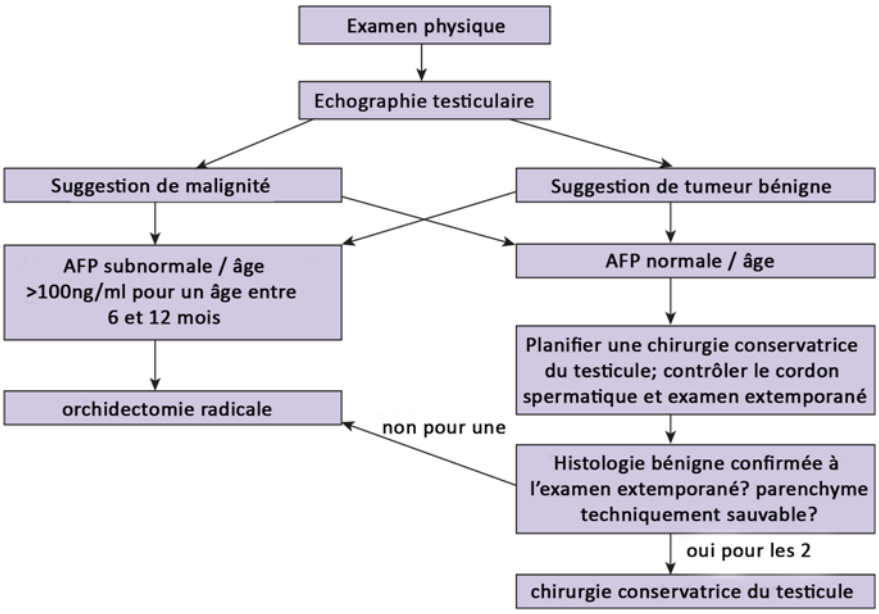


**Fig-5: Algorithm for the appropriate surgical management of testicular tumors in children**

No patients had lymphaelectal lymph node dissection. In total, of the 12 patients followed for a nonseminomatous germ cell tumor, 9 were in remission with 3 discontinuations during treatment. Until today, 3 patients are still monitored in our structure and are in remission with a decline of 5 to 10 years.

## DISCUSSION

Testicular tumors are rare and distinct from those of adults. The most frequent clinical presentation (> 90%) is that of a painless scrotal mass, with a history of trauma or contusion and a hydrocele or hernia in less than 10% of cases [4]. Yolk sac tumors represent the most frequent histological type, followed by teratoma, which is considered to be malignant in adults and benign in children, whether mature or immature [7]. Our data show that 35% of all tumors were non-seminomatous germ tumors, 69.2% of which were yolk sac tumors. In the literature, yolk sac tumors and mature teratoma were the two most common testicular tumors. Embryonic carcinoma and immature teratoma were the third most common types of tumors, and although not common in children, they were not uncommon in some reports [8].

Of the 13 patients, the mean age is 25 months, which supports the fact that there is a peak incidence of testicular tumors during the first 3 years of life [9, 10]. Teratomas occur at a younger age than yolk sac tumors. We also found that the right side was predominant which was also noted by Gupta *et al*. [11] and Ciftci *et al*. [1] although another study indicated that both sides were reached in the same proportion [12].

The serum AFP assay is a very important tumor marker for primary, recurrent or metastatic disease, and over 90% correlation has been reported with yolk sac tumors [13]. Thus patients with a solid mass on ultrasound and a high AFP, have a considerable probability of a yolk sac tumor. However, serum AFP levels were normally elevated in infants and returned to normal at 8 months of age. As a result, high levels of AFP could be detected in infants with benign testicular tumors [14].

In our series, AFP returned positive in 8 patients with yolk sac tumors in whom it was dosed before surgery and 2 patients with embryonic carcinoma while it returned negative in the case of teratoma. Ultrasound when combined with other clinical data is highly sensitive for the detection of testicular tumors and highly reliable in differentiating between benign and malignant lesions [10]. Metcalf *et al*. reported the results of 13 preoperative ultrasounds suggesting benign tumors. All were confirmed as benign teratomas after final histopathological analysis.

In contrast, the serum assay of βHCG is not a useful marker. In current series, only two patients with yolk sac tumors had slightly elevated serum βHCG levels. The βHCG levels returned to normal following inguinal orchiectomy. Thus, these serum βHCG levels could be false positives [15].

LDH is very non-specific, but can be increased in 60% of non-seminomatous germ tumors of the testis [16]. In cases where there is a suspicion of malignancy, CT or MRI imaging of the chest, abdomen, and pelvis is required to determine the stage and therapeutic plan, as 20% of the vitelline tumors are associated to pulmonary metastases [4].

The gold standard is inguinal orchiectomy with first ligation of the cord to the ring. Orchiectomy as well as scrotal biopsy is formally contraindicated because it changes the lymphatic drainage of the testis and exposes it to the risk of dissemination to the scrotum [16].

The case of scrotal orchiectomy of our series was performed in a peripheral center by a doctor who did not know the pathology. Conservative surgery for testicular cancers offers psychological, aesthetic and functional benefits [10], should be offered to children with benign testicular tumors, including mature teratoma, preoperative assessment plays an important role in the selection of patients who may be candidates for conservative treatment.

Preoperative scrotal ultrasound, serum tumor markers, and the history of the disease are useful for determining whether the tumor is from testes or para-testicular tissues and distinguishing yolk sac tumors from other types, particularly teratoma mature, which is the second most common type [14, 17]. Shukla *et al*. [6] and Sugita *et al*. [2] reported that conservative testicular surgery was feasible and without the risk of recurrence or atrophy with a follow-up of nearly 5 years.

From a practical point of view, if a benign histological type is confirmed, the remaining normal testis could be reintegrated into the scrotum, otherwise inguinal radical orchiectomy should be performed (Figure 5) [15]. However, we did not perform a partial orchiectomy in any of our patients.

Many multicenter trials have reported that 80% of pre-pubertal patients with yolk sac tumors had stage I cancers, and that chemotherapy was not recommended for those patients whose AFP levels returned to normal after surgery [4, 12, 13]. Failure to normalize AFP postoperatively suggests residual disease or advanced disease and requires chemotherapy [10, 18].

Our data show that 6 of the 9 patients with vitelline tumor who were initially assumed to be stage I had elevated levels of postoperative AFP, making the possibility that these patients were not actually stage I. The overall prognosis of patients with yolk sac tumors in our study was satisfactory.

Because the tumors of the yolk sac of the child give less metastases to the retro-peritoneal ganglia than those of the adult, that in nearly half of the cases there are pulmonary metastases without retro-peritoneal metastases and that in addition the ganglionic dissection retro-peritoneal in children has been associated with higher morbidities than in adults and preservation of the nerves was difficult to accomplish, all of which means that retro-peritoneal lymph node dissection is rarely used as a preventive treatment of the disease at an early stage [ 14]. In our series we found retroperitoneal lymphadenopathy in 2 patients who disappeared after chemotherapy.

## CONCLUSION

The prognosis of the testicular germs of the child is excellent. Yolk sac tumors and teratoma are the most common tumors [2].

For stage I yolk sac tumors, inguinal orchiectomy alone may be sufficient, rescue chemotherapy is promising, and ganglion dissection may not be necessary. Conservative testicular surgery may be indicated for benign tumors with negative markers after histological confirmation.

### Current state of knowledge on the subject

- The therapeutic management of testicular tumors in children still raises many questions today;
- The therapeutic recommendations propose performing an orchiectomy and adjuvant chemotherapy according to the histological type.

### Contribution of our study to knowledge

- The inguinal orchiectomy with first ligation of the cord to the ring remains the standard treatment for non-seminomatous germ tumors;
- Through our experience, we sensitize practitioners to the proper diagnostic and therapeutic management of these tumors;
- Precise information to the patient's parents about the various therapeutic modalities, their advantages and disadvantages in order to avoid lost sight of them.

## REFERENCES

1. Ciftci AO, Bingöl-Koloğlu M, Senocak ME, Tanyel FC, Büyükpamukçu M, Büyükpamukçu N.Testicular tumors in children. J Pediatr Surg. 2001 Dec;36(12):1796-801.
2. Sugita Y, Clarnette TD, Cooke-Yarborough C, Chow CW, Waters K, Hutson JM. Testicular and paratesticular tumours in children: 30 years' experience. Aust N Z J Surg. 1999 Jul;69(7):505-8.

3. Terenziani M, Piva L, Spreafico F, Salvioni R, Massimino M, Luksch R, Cefalo G, Casanova M, Ferrari A, Polastri D, Mazza E. Clinical stage I nonseminomatous germ cell tumors of the testis in childhood and adolescence: an analysis of 31 cases. Journal of pediatric hematology/oncology. 2002 Aug 1;24(6):454-8.
4. Ahmed HU, Arya M, Muneer A, Mushtaq I, Sebire NJ. Testicular and paratesticular tumours in the prepubertal population. The lancet oncology. 2010 May;11(5):476-83.
5. Taskinen S, Fagerholm R, Aronniemi J, Rintala R, Taskinen M. Testicular tumors in children and adolescents. Journal of pediatric urology. 2008 Apr;4(2):134-7.
6. Shukla AR, Woodard C, Carr MC, Huff DS, Canning DA, Zderic SA, Kolon TF, SNYDER III HM. Experience with testis sparing surgery for testicular teratoma. The Journal of urology. 2004 Jan 1;171(1):161-3.
7. Walsh C, Rushton HG. Diagnosis and management of teratomas and epidermoid cysts. Urol Clin North Am. 2000 Aug;27(3):509-18.
8. Stang A, Rusner C, Eisinger B, Stegmaier C, Kaatsch P. Subtype-specific incidence of testicular cancer in Germany: a pooled analysis of nine population-based cancer registries. Int J Androl. 2009 Aug;32(4):306-16
9. Bujons A, Sfulcini JC, Pascual M, Feu OA, Garat JM, Villavicencio H. Prepubertal testicular tumours and efficacy of testicular preserving surgery. BJU international. 2011 Jun;107(11):1812-6.
10. Wang X, Xu S, Tang D, Li M, Wu D, Huang Y. Prepubertal testicular and paratesticular tumors in China: a single-center experience over a 10-year period. J Pediatr Surg. 2012 Aug;47(8):1576-80.
11. Gupta DK, Kataria R, Sharma MC. Prepubertal testicular teratomas. Eur J Pediatr Surg. 1999 Jun;9(3):173-6.
12. Grady RW, Ross JH, Kay R. Epidemiological features of testicular teratoma in a prepubertal population. J Urol. 1997 Sep;158(3 Pt 2):1191-2.
13. Ross JH, Rybicki L, Kay R. Clinical behavior and a contemporary management algorithm for prepubertal testis tumors: a summary of the Prepubertal Testis Tumor Registry. J Urol. 2002 Oct;168(4 Pt 2):1675-8; discussion 1678-9.
14. Ye YL, Sun XZ, Zheng FF, Bian J, Huang YP, Zhang XQ, Li ZX, Nie Y, Qin ZK, Dai YP. Clinical analysis of management of pediatric testicular germ cell tumors. Urology. 2012 Apr 1;79(4):892-7.
15. Hisamatsu E, Takagi S, Nakagawa Y, Sugita Y, Yoshino K, Ueoka K, Tanikaze S. Prepubertal testicular tumors: a 20-year experience with 40 cases. Int J Urol. 2010 Nov;17(11):956-9.
16. Pohl HG, Shukla AR, Metcalf PD, Cilento BG, Retik AB, Bagli DJ, Huff DS, Rushton HG. Prepubertal testis tumors: actual prevalence rate of histological types. The Journal of urology. 2004 Dec 1;172(6):2370-2.
17. Madden-Fuentes R, Wiener JS, Ross SS, Routh JC. Partial orchiectomy for bilateral synchronous testicular masses in a prepubescent boy: a case report. Urology. 2012 Nov;80(5):1144-6.
18. Schlatter M, Rescorla F, Giller R, Cushing B, Vinocur C, Colombani P, Cullen J, London W, Davis M, Lauer S, Olson T. Excellent outcome in patients with stage I germ cell tumors of the testes: a study of the Children's Cancer Group/Pediatric Oncology Group. Journal of pediatric surgery. 2003 Mar 1;38(3):319-24.