WILMS' TUMOR: GENETIC ASPECTS, DIAGNOSIS AND TREATMENT: A LITERATURE REVIEW

TUMOR DE WILMS ASPECTOS GENÉTICOS, DIAGNÓSTICO E TRATAMENTO: UMA REVISÃO BIBLIOGRÁFICA

TUMOR DE WILMS: ASPECTOS GENÉTICOS, DIAGNÓSTICO Y TRATAMIENTO: UNA REVISIÓN DE LA LITERATURA

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ABSTRACT

Renal tumors account for approximately 7% of all pediatric tumors; however, Wilms tumor is the most common renal tumor in children, particularly those between 2 and 5 years of age. Its etiology is not yet fully understood, but it is known that certain genetic conditions may be associated with an increased risk of developing this tumor. As it is a malignant neoplasm, early diagnosis is essential to improve patient prognosis. Therefore, periodic screening through abdominal ultrasonography is necessary in patients with a genetic predisposition to this neoplasm. Most patients are asymptomatic, presenting only with a unilateral palpable abdominal mass during physical examination. However, other possible symptoms associated with this condition include arterial hypertension, abdominal pain, hematuria, fever, anemia, leukocytosis, constipation, and fatigue. The therapeutic approach for this tumor involves combined treatment, including chemotherapy, surgical tumor resection, and/or radiotherapy. Staging of Wilms tumor should be performed through the analysis of imaging studies to detect renal masses and distant metastases, thereby allowing for appropriate and individualized treatment planning for each patient. The primary objective of this study is to conduct a literature review on the genetic influence in Wilms tumor, as well as its diagnostic methods and emerging therapeutic options for this condition. The methodology adopted for the proposed literature review is based on the analysis and review of scientific articles published between 2021 and 2025, identified through searches in the PubMed, SciELO, and Google Scholar databases, using the following keywords: “Wilms Tumor,” “Tumor de Wilms,” “Nephroblastoma,” “Wilms tumor gene 1,” and “WT1 gene.”. Based on the analyzed studies, Wilms tumor is identified as a highly prevalent malignant pediatric renal neoplasm with a genetic component associated with its etiology. Its clinical presentation is variable, ranging from asymptomatic to oligosymptomatic forms. Diagnosis is initially established through clinical history and physical examination, with imaging studies requested for diagnostic confirmation. Furthermore, treatment of this neoplasm involves a combination of therapeutic modalities, namely nephrectomy followed by systemic chemotherapy. Thus, early diagnosis and the integration of surgical and adjuvant approaches are essential to optimize prognosis, highlighting the importance of continuous scientific research and specialized care. Finally,

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there is a clear need to intensify efforts to ensure timely diagnosis and appropriate treatment for children affected by Wilms tumor.

Keywords: Wilms Tumor. Nephroblastoma. Wilms Tumor Gene-1. WT1 Gene.

RESUMO

Os tumores renais compreendem cerca de 7% de todos os tumores pediátricos, contudo o Tumor de Wilms é o tumor renal mais comum em crianças, principalmente daquelas na faixa etária entre 2 a 5 anos de idade. A sua causa ainda não está muito bem salientada, mas sabe-se que algumas condições genéticas podem estrar associadas a um maior risco de desenvolvimento desse tumor. Por se tratar de uma neoplasia maligna, o diagnóstico precoce é primordial para a melhora do prognóstico do paciente. Dessa forma, é necessário realizar rastreio periodicamente, por meio de ultrassonografia de abdome, nos pacientes que possuem predisposição genéticas para essa neoplasia. A grande maioria dos pacientes cursam de forma assintomática, apresentando apenas uma massa abdominal palpável unilateral durante o exame físico. Contudo, outros possíveis sintomas associados a essa patologia são: hipertensão arterial, dor abdominal, hematúria, febre, anemia, leucocitose, constipação e fadiga. O esquema terapêutico para esse tumor abrange tratamento combinado que inclui quimioterapia, cirurgia para ressecção do tumor e/ou radioterapia. O estadiamento do Tumor de Wilms deve ser realizado por meio da análise de exames de imagem para detecção de massa nos rins e metástase a distância, e por meio disso é possível planejar o tratamento de maneira adequada e individualizada para cada paciente. O objetivo fundamental da pesquisa é realizar uma revisão bibliográfica acerca da influência genética no Tumor de Wilms, bem como é realizado seu diagnóstico e as novas opções terapêuticas para essa patologia. A metodologia adotada para a revisão bibliográfica proposta baseia-se na análise e leituras de artigos científicos publicados entre os anos de 2021 a 2025, os quais serão encontrados através de pesquisas nas plataformas PubMed, SciELO e Google Acadêmico, utilizando os unitermos: “Wilms Tumor”, “Tumor de Wilms”, “Nefroblastoma”, “Wilms tumor gene-1”, “gene WT 1”. Tendo como base o estudo realizado, percebe-se que Tumor de Wilms constitui uma neoplasia maligna renal infantil, de alta prevalência e que possui um componente genético associado à sua etiologia. Seu quadro clínico é bem variável, podendo ser assintomático ou oligossomático. O diagnóstico é inicialmente realizado por meio da história clínica e exame físico, exames de imagem podem ser solicitados para a confirmação diagnóstica. Ademais, o tratamento da neoplasia supracitada é realizado combinado algumas terapias, ou seja, nefrectomia seguida de quimioterapia sistêmica. Logo, o diagnóstico precoce e a integração de abordagens cirúrgicas e adjuvantes são fundamentais para otimizar o prognóstico, o que evidencia a importância de investigação científica contínua e de assistência especializada. Em síntese, percebe-se a necessidade de se empregar esforços para que haja o diagnóstico e o tratamento adequado das crianças acometidas pelo Tumor de Wilms.

Palavras-chave: Wilms Tumor. Tumor de Wilms. Nefroblastoma. Wilms Tumor Gene-1. Gene WT 1.

RESUMEN

Los tumores renales representan aproximadamente el 7% de todos los tumores pediátricos; sin embargo, el tumor de Wilms es el tumor renal más común en niños, especialmente en aquellos entre 2 y 5 años de edad. Su causa aún no se comprende completamente, pero se sabe que algunas condiciones genéticas pueden estar asociadas con un mayor riesgo de desarrollar este tumor. Al ser una neoplasia maligna, el diagnóstico temprano es fundamental para mejorar el pronóstico del paciente. Por lo tanto, es necesario el cribado periódico, mediante ecografía abdominal, en pacientes con predisposición genética a esta neoplasia. La gran mayoría de los pacientes son asintomáticos, presentando únicamente una masa

abdominal unilateral palpable durante la exploración física. Sin embargo, otros posibles síntomas asociados con esta patología son: hipertensión arterial, dolor abdominal, hematuria, fiebre, anemia, leucocitosis, estreñimiento y fatiga. El régimen terapéutico para este tumor implica un tratamiento combinado que incluye quimioterapia, cirugía para la resección del tumor y/o radioterapia. La estadificación del tumor de Wilms debe realizarse mediante el análisis de estudios de imagen para detectar masas renales y metástasis a distancia, lo que permite una planificación terapéutica adecuada e individualizada para cada paciente. El objetivo fundamental de esta investigación es realizar una revisión bibliográfica sobre la influencia genética en el tumor de Wilms, así como su diagnóstico y las nuevas opciones terapéuticas para esta patología. La metodología adoptada para la revisión bibliográfica propuesta se basa en el análisis y la lectura de artículos científicos publicados entre 2021 y 2025, que se encontrarán mediante búsquedas en las plataformas PubMed, SciELO y Google Académico, utilizando las palabras clave: "Wilms Tumor", "Tumor de Wilms", "Nefroblastoma", "Wilms tumor gene-1", "gene WT 1". Con base en el estudio realizado, se observa que el tumor de Wilms constituye una neoplasia renal maligna en niños, con alta prevalencia y un componente genético asociado a su etiología. La presentación clínica es bastante variable, pudiendo ser asintomática u oligosomática. El diagnóstico se realiza inicialmente mediante la historia clínica y la exploración física. Se pueden solicitar estudios de imagen para la confirmación diagnóstica. Además, el tratamiento de la neoplasia mencionada implica una combinación de terapias, concretamente nefrectomía seguida de quimioterapia sistémica. Por lo tanto, el diagnóstico precoz y la integración de enfoques quirúrgicos y adyuvantes son fundamentales para optimizar el pronóstico, lo que resalta la importancia de la investigación científica continua y la atención especializada. En resumen, es necesario realizar esfuerzos para garantizar el diagnóstico y el tratamiento adecuado de los niños afectados por el tumor de Wilms.

Palabras clave: Tumor de Wilms. Nefroblastoma. Gen-1 del Tumor de Wilms. Gen WT1.

1 INTRODUCTION

Renal neoplasms represent a significant portion of solid tumors in childhood, accounting for approximately 7% to 8% of all pediatric neoplasms, with Wilms' tumor standing out as the most prevalent entity in this age group (JÚNIOR; BURNS; LOPEZ, 2021; PEDIATRIA, 2024). Wilms' Tumor, also called nephroblastoma, is an embryonic malignant neoplasm of the kidney that predominantly affects children under five years of age, with a peak incidence between two and five years of age (INCA, 2022; LESLIE; SAJJAD; MURPHY, 2025).

From a historical and conceptual point of view, Wilms' Tumor has been described as a neoplasm derived from remnants of the metanephric blastema, reflecting failures in the normal processes of renal differentiation and maturation during embryonic development (KUMAR, 2018; PRAY; PERSAUD; TORCHIA, 2022). These embryological alterations justify the characteristic histological composition of the tumor, often described as tryposic, including blastematous, epithelial, and stromal components (KUMAR, 2018; SILVA et al., 2021). Advances in molecular genetics have allowed a better understanding of the etiopathogenesis of Wilms' Tumor, evidencing the participation of mutations and epigenetic alterations in genes that regulate renal development, such as WT1, WT2, WTX, and CTNNB1 (KUMAR, 2018; ZENG et al., 2024). In addition, the association of nephroblastoma with specific genetic syndromes, such as WAGR, Denys-Drash, and Beckwith-Wiedemann, reinforces the central role of genetics in tumor genesis and risk stratification in these patients (LESLIE; SAJJAD; MURPHY, 2025; PEDIATRIA, 2024).

Clinically, Wilms' Tumor presents insidiously in most cases, with a painless abdominal mass being the most frequent finding, often identified incidentally by caregivers (ALVES FILHO et al., 2024; IVO BRAZ et al., 2022). Other signs and symptoms may include hematuria, abdominal pain, hypertension, and nonspecific systemic manifestations, especially in more advanced stages of the disease (SILVA et al., 2023; SILVA et al., 2021).

The diagnosis of Wilms' Tumor is based on the correlation between clinical data, imaging tests and histopathological evaluation, with abdominal ultrasonography being the most used initial method, followed by computed tomography or magnetic resonance imaging for staging and therapeutic planning (MOORE; AGUR, 2024; MAIA et al., 2022). The correct identification of tumor staging and histological subtype is essential for defining the therapeutic approach and for prognostic estimation (PDQ, 2024; PEDIATRIA, 2024).

The treatment of Wilms' Tumor is characterized by a multimodal approach, involving surgery, chemotherapy and, in specific situations, radiotherapy, with well-established protocols that have provided a significant increase in survival rates in recent decades (PDQ,

2024; SILVA et al., 2021). Despite therapeutic advances, late treatment-related effects, such as renal dysfunction, cardiotoxicity, and growth changes, remain relevant challenges in the long-term follow-up of these patients (SILVENTE BERNAL et al., 2024).

In this context, it is essential to carry out bibliographic reviews that integrate current knowledge about the genetic, diagnostic, and therapeutic aspects of Wilms' Tumor, contributing to scientific updating and improving clinical practice (MAIA et al., 2022; ZENG et al., 2024).

Thus, the present study aims to comprehensively review the scientific literature on Wilms' Tumor, addressing its main genetic aspects, diagnostic methods, and therapeutic strategies, in light of the most recent evidence available (PDQ, 2024; PEDIATRIA, 2024).

2 MATERIALS AND METHODS

The present study consists of a narrative literature review, with a qualitative approach and descriptive-analytical character, developed with the objective of gathering and critically analyzing the existing scientific production on Wilms' Tumor, with emphasis on its genetic aspects, diagnostic methods and therapeutic approaches. The research was carried out through data collection in recognized scientific databases, including PubMed/MEDLINE, SciELO and Google Scholar, in addition to consulting textbooks, academic dissertations and official documents of government agencies in the health area, using the physical and digital infrastructure of the University of Ribeirão Preto. Descriptors in Portuguese and English, such as "Wilms Tumor", "Wilms Tumor", "Nephroblastoma", "Wilms tumor gene-1" and "WT1 gene", were applied in isolation or in combination. As inclusion criteria, we selected publications available in full, in Portuguese, English, or Spanish, published between 2021 and 2025, which directly addressed genetic aspects, clinical, laboratory, and imaging diagnoses, as well as therapeutic strategies related to Wilms' Tumor, excluding duplicate studies, outside the time frame, or not relevant to the proposed objectives. The selected materials were submitted to exploratory and analytical reading, with data organization according to the thematic axes of the study, and the findings were discussed with the advisor and analyzed in a qualitative and comparative way, in order to identify convergences, divergences and advances in scientific knowledge.

3 RESULTS

The analysis of the selected scientific literature showed that Wilms' Tumor is the main malignant renal neoplasm of childhood, accounting for approximately 85% to 90% of pediatric renal tumors and about 7% to 8% of all malignant neoplasms in this age group (JÚNIOR;

BURNS; LOPEZ, 2021; PEDIATRICS, 2024; LESLIE; SAJJAD; MURPHY, 2025). The reviewed studies showed a higher incidence in children under the age of five, with a peak between two and five years, with no absolute consensus regarding the predominance by sex (INCA, 2022; SILVA et al., 2023).

Regarding genetic aspects, the findings pointed to a strong association between Wilms' Tumor and alterations in genes involved in renal embryonic development, especially the genes WT1, WT2, WTX, and CTNNB1, located mostly on chromosome 11 (KUMAR, 2018; ZENG et al., 2024). A consistent relationship was also observed between nephroblastoma and specific genetic syndromes, such as WAGR, Denys-Drash and Beckwith-Wiedemann, which significantly increase the risk of tumor development in the pediatric population (LESLIE; SAJJAD; MURPHY, 2025; PRAY; PERSAUD; TORCHIA, 2022).

Regarding the clinical manifestations, the reviewed literature indicated that the most frequent presentation of Wilms' Tumor is the presence of a painless abdominal mass, often detected incidentally by those responsible for it (ALVES FILHO et al., 2024; IVO BRAZ et al., 2022). Other recurrent clinical signs include abdominal pain, hematuria, arterial hypertension secondary to activation of the renin-angiotensin system, and, in more advanced stages, systemic symptoms such as fever, anorexia, weight loss, and anemia (SILVA et al., 2021; SILVA et al., 2023).

Regarding the diagnosis, the results showed that imaging methods play a central role in the initial investigation, with abdominal ultrasonography being the first-line examination, followed by computed tomography or magnetic resonance imaging for tumor staging and evaluation of local and metastatic extension (MOORE; AGUR, 2024; MAIA et al., 2022). Diagnostic confirmation is based on histopathological analysis, in which Wilms' Tumor classically presents a tripaltic pattern composed of blastematous, epithelial, and stromal elements, although histological variants have also been described (KUMAR, 2018; SILVA et al., 2021).

In the field of laboratory markers, studies have shown that there is, to date, no specific serum marker widely validated for Wilms Tumor, however recent evidence points to an increase in alpha-fetoprotein in rare subgroups of patients, suggesting potential future utility as a complementary biomarker (GREEN et al., 2024). In parallel, investigations in molecular genetics and bioinformatics have identified candidate genes with possible prognostic and therapeutic value, broadening the prospects for personalized medicine (ZENG et al., 2024).

With regard to treatment, the results confirmed that the therapeutic approach to Wilms' Tumor is predominantly multimodal, involving surgery, chemotherapy and, in selected cases,

radiotherapy, according to staging and histological subtype (PDQ, 2024; PEDIATRIA, 2024). Radical nephrectomy remains the standard surgical treatment, being associated with chemotherapy regimens based mainly on vincristine, actinomycin D, and doxorubicin, which has provided high survival rates, especially in cases diagnosed early (PDQ, 2024; SILVA et al., 2021).

In view of the above, the literature analyzed showed that, despite therapeutic advances and favorable prognosis, the late effects of treatment, such as renal dysfunction, cardiotoxicity, growth alterations, and increased risk of secondary neoplasms, represent important challenges in the long-term follow-up of surviving patients (SILVENTE BERNAL et al., 2024; PEDIATRIA, 2024).

4 DISCUSSION

The results obtained in this literature review corroborate the literature by showing Wilms' Tumor as the main malignant renal neoplasm of childhood, with a high incidence in children under five years of age, a fact that reinforces its embryonic nature and its close relationship with failures in renal differentiation processes during fetal development (JÚNIOR; BURNS; LOPEZ, 2021; PRAY; PERSAUD; TORCHIA, 2022). This characteristic explains both the observed age peak and the frequent association with congenital genetic alterations and developmental syndromes (LESLIE; SAJJAD; MURPHY, 2025).

The discussion of genetic aspects shows that mutations in the WT1, WT2, WTX, and CTNNB1 genes play a central role in the pathogenesis of Wilms' Tumor, since these genes act directly in the regulation of nephrogenesis and in the maintenance of renal cell differentiation (KUMAR, 2018; ZENG et al., 2024). The consistent association with syndromes such as WAGR, Denys-Drash, and Beckwith-Wiedemann reinforces the importance of clinical surveillance in children with these conditions, since early screening can positively impact prognosis (LESLIE; SAJJAD; MURPHY, 2025; PEDIATRIA, 2024).

In the clinical context, the predominance of a painless abdominal mass as the main manifestation reinforces the insidious nature of the disease and explains the often late diagnosis in some cases, especially in populations with limited access to health services (ALVES FILHO et al., 2024; IVO BRAZ et al., 2022). The presence of signs such as hematuria, hypertension, and systemic symptoms in more advanced stages highlights the importance of detailed clinical evaluation and early diagnostic suspicion by health professionals (SILVA et al., 2021; SILVA et al., 2023).

The analysis of diagnostic methods demonstrates that imaging tests are indispensable in the identification and staging of Wilms' Tumor, and abdominal ultrasonography is widely

recommended as an initial test due to its accessibility and absence of ionizing radiation (MOORE; AGUR, 2024; MAIA et al., 2022). Computed tomography and magnetic resonance imaging complement the investigation by providing detailed information on tumor extension, vascular involvement, and the presence of metastases, essential aspects for therapeutic planning (PDQ, 2024). Histopathological confirmation remains the diagnostic gold standard, with the identification of the tripaltic pattern being a classic element, although the existence of histological variants requires special attention due to their prognostic implication (KUMAR, 2018; SILVA et al., 2021). The distinction between tumors of favorable and unfavorable histology is decisive in the stratification of risk and in the choice of treatment intensity, as recommended by the main international protocols (PDQ, 2024; PEDIATRIA, 2024).

With regard to laboratory markers, the absence of specific serum biomarkers limits noninvasive follow-up of the disease, although recent studies indicate an increase in alpha-fetoprotein in rare subgroups of patients, which opens perspectives for future clinical applications and additional research (GREEN et al., 2024). At the same time, advances in bioinformatics and molecular genetics have allowed the identification of candidate genes with potential prognostic and therapeutic value, pointing to the possibility of more personalized approaches in the future (ZENG et al., 2024).

The discussion about treatment shows that the multimodal approach, involving surgery, chemotherapy and, in selected cases, radiotherapy, is responsible for the high survival rates currently observed, especially in patients diagnosed in early stages (PDQ, 2024; SILVA et al., 2021). Radical nephrectomy associated with standardized chemotherapy regimens has established itself as an effective therapeutic strategy, reflecting the advances in pediatric oncology in recent decades (PEDIATRIA, 2024).

However, despite the favorable prognosis, the late effects of treatment represent a growing challenge, including chronic renal dysfunction, cardiotoxicity related to the use of anthracyclines, growth alterations, and increased risk of secondary neoplasms (SILVENTE BERNAL et al., 2024). These findings reinforce the need for longitudinal follow-up of these patients and the continuous search for less toxic and more targeted therapies (GREEN et al., 2024; ZENG et al., 2024).

As a result, the discussion of the analyzed data shows that Wilms' Tumor, although it has high cure rates, still requires advances in early diagnosis, individualization of treatment, and reduction of late sequelae, highlighting the relevance of integrative literature reviews for scientific updating and improvement of medical practice (MAIA et al., 2022; PEDIATRIA, 2024).

5 FINAL CONSIDERATIONS

The present literature review allowed us to consolidate the understanding that Wilms' Tumor is the main malignant renal neoplasm of childhood, with high clinical and epidemiological relevance, especially in children under five years of age, which reinforces its close relationship with embryological and genetic alterations of renal development (JÚNIOR; BURNS; LOPEZ, 2021; PRAY; PERSAUD; TORCHIA, 2022). The findings show that the etiopathogenesis of nephroblastoma is strongly associated with mutations and epigenetic alterations in nephrogenesis regulatory genes, such as WT1, WT2, WTX, and CTNNB1, as well as the occurrence of specific genetic syndromes, which require differentiated clinical surveillance and early screening (KUMAR, 2018; LESLIE; SAJJAD; MURPHY, 2025; ZENG et al., 2024).

From a clinical and diagnostic point of view, it was found that the insidious presentation of the disease, characterized mainly by the presence of a painless abdominal mass, poses challenges to early detection, highlighting the importance of clinical suspicion and timely access to appropriate imaging methods (ALVES FILHO et al., 2024; MAIA et al., 2022). The association between imaging studies and histopathological evaluation proved to be indispensable for the correct tumor staging and for the definition of the prognosis, especially with regard to the differentiation between favorable and unfavorable histology (MOORE; AGUR, 2024; KUMAR, 2018; SILVA et al., 2021).

With regard to treatment, the studies analyzed demonstrated that the multimodal approach, based on nephrectomy associated with chemotherapy and, in selected cases, radiotherapy, resulted in significant survival rates, evidencing the advances achieved by pediatric oncology in recent decades (PDQ, 2024; PEDIATRIA, 2024). However, the late effects related to the therapies employed, such as renal dysfunction, cardiotoxicity, and growth changes, remain important challenges in the long-term follow-up of surviving patients, requiring continuous and individualized follow-up strategies (SILVENTE BERNAL et al., 2024).

In view of this, it is observed that recent advances in molecular genetics and in the identification of potential biomarkers open promising perspectives for the development of more targeted and less toxic therapeutic approaches, contributing to the improvement of the quality of life of patients affected by Wilms' Tumor (GREEN et al., 2024; ZENG et al., 2024).

In view of the above, it is concluded that the continuity of scientific research in this area is essential for the improvement of early diagnosis, therapeutic individualization and the reduction of late sequelae, reaffirming the relevance of literature review studies for updating

knowledge and strengthening evidence-based medical practice (MAIA et al., 2022; PEDIATRIA, 2024).

REFERENCES

Alves Filho, A. B. M., Rocha, A. L. G., Cunha, I. A., Corrêa, P. X. A., & Mattos, G. A. (2024). Tumor de Wilms: Manifestações clínicas e tratamento cirúrgico. Revista Ibero-Americana de Humanidades, Ciências e Educação, 10(3), 138–148. https://doi.org/10.51891/rease.v10i3.13132

Dalley II, A. F., & Agur, A. M. R. (2024). Moore anatomia orientada para a clínica (9ª ed.). Guanabara Koogan. (E-book; ISBN 978-85-277-4012-8)

Green, R., Ahmed, A., Fleming, B., Long, A. M., Behjati, S., Trotman, J., Tarpey, P., Nicholson, J. C., Coleman, N., Hook, C. E., & Murray, M. J. (2024). Wilms tumor with raised serum alpha-fetoprotein: Highlighting the need for novel circulating biomarkers. Pediatric and Developmental Pathology, 27(3), 260–265. https://doi.org/10.1177/10935266231213467

Ivo Braz, M., Félix Lima Gomes, W., Katarina Gonçalves de Siqueira, A., & Azevedo Foinquinos, R. (2022). Diagnóstico e manejo do tumor de Wilms na população infantil. Anais da Faculdade de Medicina de Olinda, 1(7), 42–49. https://doi.org/10.56102/afmo.2022.210

Júnior, D. C., Burns, D. A. R., & Lopez, F. A. (2021). Tratado de pediatria: Vol. 2 (5ª ed.). Manole.

Kumar, V. (2018). Robbins patologia básica (10ª ed.). GEN Guanabara Koogan. (E-book; ISBN 978-85-9515-189-5)

Leslie, S. W., Sajjad, H., & Murphy, P. B. (2023). Wilms tumor. In StatPearls. StatPearls Publishing. https://www.ncbi.nlm.nih.gov/books/NBK442013/

Maia, A. G., et al. (2022). Abordagens no diagnóstico diferencial das neoplasias infantis: Foco em tumor de Wilms, impacto e abrangência. Revista Coopex, 13(2), 124–134. https://doi.org/10.61223/coopex.v13i2.592

Moore, K. L., Persaud, T. V. N., & Torchia, M. G. (2022). Embriologia básica (10ª ed.). GEN Guanabara Koogan. (E-book; ISBN 978-85-9515-902-0)

Pediatria, Sociedade Brasileira de. (2024). Tratado de pediatria (6ª ed.). Manole.

PDQ Pediatric Treatment Editorial Board. (2024). Wilms tumor and other childhood kidney tumors treatment (PDQ®): Health professional version. In PDQ cancer information summaries. National Cancer Institute. https://www.cancer.gov/types/kidney/hp/wilms-treatment-pdq

Schünke, M., Schulte, E., & Schumacher, U. (2024). Prometheus | Coleção - Atlas de anatomia: 3 volumes (6ª ed.). Guanabara Koogan. (E-book; ISBN 978-85-277-4053-1)

Silva, A. M. J., Mota, A., Santana, A., Valois, R., Augusto, T., Lomanto, T., Cyrino, R. F., Marinho, D. L., Nunes, K. C., Alencar, A. C. S., Santos, V. G. M., Rocha, M. T., Amorim, B. V. V. C., Sauer, R. M., & Veiga, S. O. (2023). Tumor de Wilms. Revista FT. https://revistaft.com.br/tumor-de-wilms/

Silva, J. M. M., Schoenberger Kipper, A. C., dos Santos Neves, B. H., Suptitz Borges, D., Lemos Salmazo, E., Pimenta Fernandes, F., Garbuio Vendramini, G., Camoesi Beltellini, S., Oliveira Reis, S., & Gonçalves da Cunha Júnior, A. (2021). Características e manejo

do tumor de Wilms: Uma revisão narrativa. Revista Eletrônica Acervo Saúde, 13(5), Article e7149.

Silvente Bernal, S., Girón Vallejo, O., Sánchez Sánchez, A., Menacho Hernández, C., Rodón Berrío, J., & Parra Gelder, B. A. (2024). Late effects of Wilms' tumor treatment. Cirugía Pediátrica, 37(3), 116–122. https://doi.org/10.54847/cp.2024.03.13

Tumor de Wilms. (2022). Instituto Nacional de Câncer (INCA). https://www.gov.br/inca/pt-br/assuntos/cancer/tipos/infantojuvenil/especificos/tumor-de-wilms

Zeng, Q., Liu, T., Qin, L., Wang, C., Peng, G., Liu, Z., & Tao, J. (2024). Screening of potential hub genes involved in kidney Wilms tumor via bioinformatics analysis and experimental validation. BMC Cancer, 24, Article 771. https://doi.org/10.1186/s12885-024-12541-x

Zugaib, M. (2023). Zugaib obstetrícia (5ª ed.). Manole. (E-book; ISBN 978-65-5576-934-0)