Scientific Research Publishing

Open Journal of Radiology, 2024, 14, 173-185
https://www.scirp.org/journal/ojrad
ISSN Online: 2164-3032
ISSN Print: 2164-3024

Diagnosis of Digestive Tumors: Experience of Bangui (Central Africa Republic) about 112 Cases

Francky Kouandongui Bangue Songrou[1*], Timothée Mobima[1], Elemence Eva Tapande Yakossa Epouse Maka[2], Yannick Héritier Sombot-Soule[1,3], Borel Tambala[1], Stéphane Kouzou[4], Judth Edwige Guiaba Kette Mokpondo[1], Euloge Tapiade Bidan[1]

[1]National Center of Medical Imaging, Bangui, Central African Republic
[2]Laboratoire National de Biologie Clinique et de Santé Publique, Bangui, Central African Republic
[3]Maman Elisabeth DOMITIEN Hospital, Bangui, Central African Republic
[4]Community Hospital of Bangui, Bangui, Central African Republic
Email: *fkouando@gmail.com

How to cite this paper: Kouandongui Bangue Songrou, F., Mobima, T., Tapande Yakossa Maka, E.E., Sombot-Soule, Y.H., Tambala, B., Kouzou, S., Guiaba Kette Mokpondo, J.E. and Tapiade Bidan, E. (2024) Diagnosis of Digestive Tumors: Experience of Bangui (Central Africa Republic) about 112 Cases. *Open Journal of Radiology*, **14**, 173-185.
https://doi.org/10.4236/ojrad.2024.144018

Received: October 7, 2024
Accepted: December 15, 2024
Published: December 18, 2024

Abstract

Background: In the Central African Republic, several studies have addressed cancers with an imaging modality based exclusively on ultrasonography, due to the lack of modern imaging. The acquisition of a multi-bar scanner should allow a better description of digestive tumor lesions before they are confirmed by histopathological examination, hence the choice of this study. **Objective**: To show the diagnostic bases of digestive tumors, particularly malignant tumors observed in Bangui. **Patients and Method**: It was a descriptive cross-sectional study over a 12-month period from April 1, 2022 to March 31, 2023. It consisted of the files of any patient referred for an abdominal CT scan. The study included all records of patients diagnosed with digestive tumor on CT and/or pathological criteria. **Results**: 384 patients underwent a digestive CT scan. One hundred and twelve (112) tumors were found, a frequency of 29%. The majority of patients were male with a sex ratio of 1.3. The mean age of patients was 54.9 years. The most represented age groups were 51 - 60 years old and 61 to 70 years old. Analysis of the CT scan indications reveals that the majority of patients were seen in the late stage of the disease. The main tumors are tumors of the liver (56.2%), kidneys (17%) and pancreas (8.1%). CT analysis of the lesions made it possible to classify the lesions into benign-looking tumors and malignant-looking tumors. The main malignancies were liver cancer (36.6%), colorectal cancer (7.1%) and gastrointestinal cancer (5.3%). There is no relationship between age and tumor type (p = 0.5). There is a relatively

very high risk of developing all three types of tumours (liver, kidney and pancreas) in females compared to females OR, [95% CI] = 2.6 [1.0 - 7.0], although this difference is not statistically significant. Regarding histopathological examinations, 20 patients out of 112 were removed (11.9% of cases) for histological confirmation. **Conclusion:** Digestive cancers occur in adults with a male predominance in Bangui and they are dominated by liver cancers. The involvement of anatomical pathology in the confirmation of lesions suspected by CT scan is still very modest. Capacity building for radiology staff is imperative, as is the acquisition of equipment for the smooth running of CT scans.

Keywords

Digestive Cancers, CT Scan, Anatomopathology, Bangui

1. Introduction

Digestive cancers remain topical in Africa as well as in the rest of the world, with an epidemiology characterized by great geographical and demographic variations [1]. They constitute a public health problem because of their high frequency, linked not only to the rapid change in eating habits, especially in large cities, but also to the increasing availability of diagnostic means [2] [3]. These are serious pathologies, which are diagnosed late in our environments [3] [4]. In 2020, they were among the cancers with a poor prognosis in the world with 1.80 million cases for lung cancer, 916,000 deaths for colorectal cancer, 830,000 deaths for liver cancer, 769,000 deaths for stomach cancer and breast cancer with 685,000 deaths [5].

Even if governments in the countries of the South have always focused their actions on infectious diseases (AIDS, tuberculosis, malaria), to the detriment of non-communicable diseases that are emerging [6]. African authors are increasingly interested in cancer [1]-[4]. Thus, in the Central African Republic, several studies have addressed cancers with an imaging modality based exclusively on ultrasonography, due to the lack of modern imaging. These various studies have highlighted the existence of several digestive tumors dominated by colorectal cancers and liver cancers, while little data is available on gastrointestinal and pancreatic cancers. The majority of these tumors were diagnosed at the late stage **[4]** [7] [8]. The acquisition of a multi-bar scanner in 2020 should allow a better description of digestive tumor lesions before they are confirmed by histopathological examination, hence the choice of this study, the objective of which is to show the diagnostic bases of digestive tumors, particularly malignant tumors observed in Bangui.

1.1. Patients and Method

This was a descriptive cross-sectional study over a 12-month period from April 1, 2022 to March 31, 2023. It consisted of the files of any patient referred for an abdominal CT scan, regardless of age or sex, and presenting during the study period. The study included all records of patients diagnosed with digestive tumor on CT

and/or pathological criteria. Not included in the study were all records of patients who had undergone an abdominal CT scan, the conclusion of which does not point to a tumor of the digestive tract, but also all incomplete records and all records of patients seen outside the study period.

The material used to carry out this study consisted of a pre-established survey sheet providing information on the patient's identity, profession, indication of the examination, examination technique, and the results of the CT scan. The anatomopathological examination register of the National Laboratory of Clinical Biology and Public Health of Bangui was also consulted in search of the results of the histopathological examination of patients suspected of digestive tumor on radiological bases and who took samples for histological confirmation. Not all tumors were removed for histopathological examination, due to a lack of local expertise in interventional radiology. The digestive tract exploration protocol was not followed due to lack of equipment. When possible, histopathological examinations were carried out either on surgical specimens or by cyto needle aspiration with a guided echo fine needle. The sample size was determined by the number of patients meeting the inclusion criteria.

1.2. Difficulties Encountered

During the study, we were confronted with various difficulties, including the retrospective nature of the study responsible for the missing data. We have not had any information on the fate of the patients.

1.3. Ethical Considerations

Having worked on the report of the examinations, the informed consent of the patients was not obtained, however, the collection and analysis of the data was carried out in strict respect of anonymity. The authorization of the head of department and the administrator of the Medical Imaging Center was obtained for the realization of this study.

2. Results

During the 12 months of the study, 384 patients underwent a digestive CT scan. One hundred and twelve (112) tumors were found, a frequency of 29%. The distribution of patients by age group is shown in Figure 1.

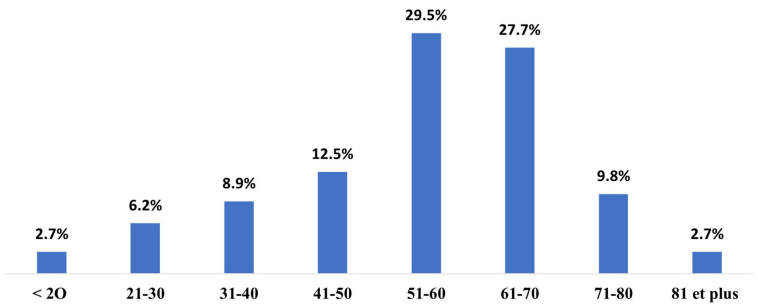

Figure 1. Age groups.

The majority of patients were male with a sex ratio of 1.3.

The mean age of patients was 54.9 years with extremes of 9 and 85 years. The most represented age groups were 51 - 60 years old and 61 to 70 years old. The indications for CT scans are presented in Table 1.

Table 1. CT scan indications.

Indication	Actual	Frequency (%)
Abdominal mass	58	51.8
Abdominal pain	15	13.4
Complementary assessment of an ultrasound	11	9.8
Jaundice	8	7.1
Assessment of the extension of a known tumor	8	7.1
Syndrome occlusif	8	7.1
Therapeutic follow-up	3	2.7
Alteration of general condition	3	2.7
Ascites	3	2.7
Follow-up of cirrhosis	1	0.9
Abdominal bloating	1	0.9

Analysis of the CT scan indications reveals that the majority of patients were seen in the late stage of the disease. About 10% were carriers of the already known malignancies (11 cases).

The different types of CT scan performed were the abdominal CT scan (17%) and the abdomino-pelvic CT scan in 83% of cases; 90% of the examinations were carried out with injection of the contrast medium and 10% without injection of the contrast medium. However, due to the lack of equipment, no examination was carried out with marking of the digestive tract with water or water-soluble contrast medium. The distribution of tumours by site is presented in Table 2.

Table 2. Distribution of tumours by site.

Indication	Actual	Frequency (%)
Liver	63	56.2
Kidney	19	17
Pancreas	9	8.1
Colo rectal	8	7.1
Gastro intestinal	6	5.3
Peritoneum	4	3.6
Gall bladder	3	2.7
Total	**112**	

The main tumors are, in descending order, tumors of the liver, kidneys, pancreas and colorectal.

CT analysis of the lesions made it possible to classify the lesions into benign-looking tumors and malignant-looking tumors. The appearance of the tumours is shown in Figure 2.

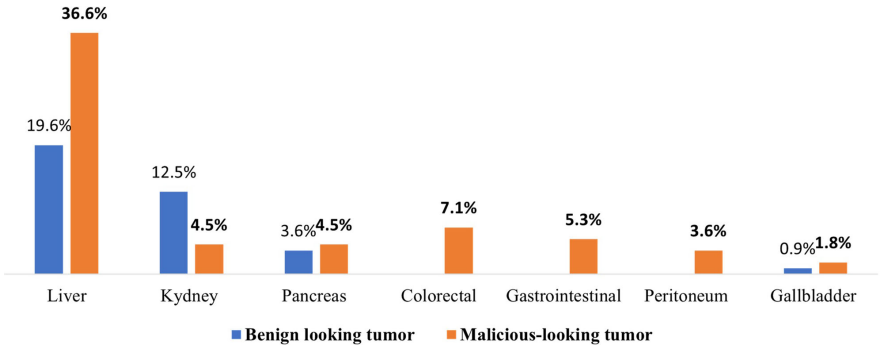

Figure 2. The appearance of the tumors on CT scan.

The main malignancies were liver cancer, colorectal cancer and gastrointestinal cancer.

Figures 3 and 4 show images of liver cancer on cirrhosis and pancreatic head cancer.

Figure 3. Image of the National Medical Imaging Center in Bangui. Patient, 62 years old, abdominal CT scan for exploration of ascites on cirrhosis, presence of nodules enhanced at arterial time and which deform the contours of the liver, abdominal ascites: Known hepatocellular carcinoma on cirrhotic liver.

Figure 4. Image of the National Medical Imaging Center in Bangui 56-year-old patient, abdominal CT scan for epigastric pain, jaundice and alteration of general condition, hypodense lesion of the head of the pancreas, not enhanced after injection, responsible for dilation of the bile ducts: cancer of the head of the pancreas.

Table 3 presents the comparison of tumours with age and sex.

Table 3. Comparison of the main tumours with age and sex.

Characteristics	Liver kidney and pancreatic tumours n (%)	Other tumours n (%)	OR [IC 95%]	p
		Age		
Age < 50 years	29 (85.3)	5 (14.7)	1.4 [0.5 - 4.5]	0.5
Age > 50 years	62 (79.5)	16 (20.5)	Ref.	
		Sex		
Male	56 (87.5)	8 (12.5)	2.6 [1.0 - 7.0]	0.05
Female	35 (73.0)	13 (17.0)	Ref.	

There is no relationship between age and tumor type (p = 0.5).

There is a relatively very high risk of developing all three types of tumours (liver, kidney and pancreas) in females compared to females OR, [95% CI] = 2.6 [1.0 - 7.0], although this difference is not statistically significant.

Table 4 presents the comparison between sex and tumor appearance.

Table 4. Comparison between sex and tumour appearance.

	Malignant-looking neoplasm, n (%)	Benign-looking tumour, n (%)	GOLD [95% CI]	p
Male	53 (82.8)	11 (17.2)	1.6 [0.6 - 4.0]	0.3
Female	36 (75.0)	12 (25.0)		

There is no relationship between age and the appearance of tumor malignancy (p = 0.3).

Regarding histopathological examinations, 20 patients out of 112 were removed (11.9% of cases) for histological confirmation (Table 5).

Table 5. Histopathological examinations.

Site	Adenocarcinoma	Other carcinoma	GIST	Embryonal tumor
Liver (n = 8/41)	1	7		
Colon et rectum (n = 2/8)	2			
Gastro intestinal (n = 5/6)	4		1	
Kidney (n = 5/5)		3		2
Total (n = 20/60)	**7**	**10**	**1**	**2**

GIST: Gastro intestinal stromal tumor.

Figure 5 shows histological image of a colon adenocarcinoma.

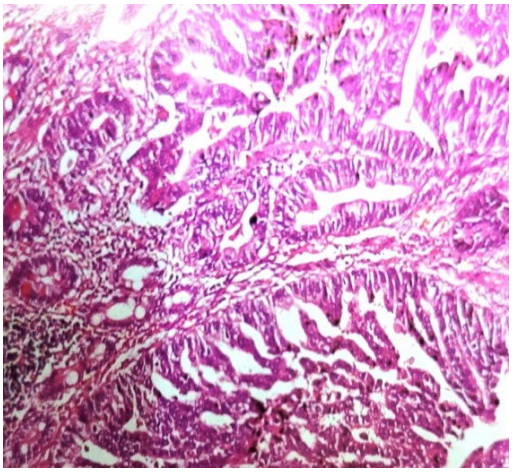

Figure 5. Histological image of a colon adenocarcinoma (HE × 40).

Image of Department of Pathological Anatomy National Biological Laboratory Clinical and public health.

3. Discussion

3.1. Limitations of the Study

This study describes the real conditions of the practice of medical imaging at the National Center for Medical Imaging in Bangui and anatomical pathology at the National Laboratory of Public Biology and Health in Bangui, which are the reference institutions in the Central African Republic. The lack of local expertise in interventional radiology for deep organ harvesting poses a problem for the histopathological confirmation of lesions observed on CT scan, anatomical pathology being the gold standard for the confirmation of the malignant or benign nature of a tumor. We can also note in anatomical pathology, difficulties in obtaining immunohistochemistry markers and poor completion of examination forms by certain clinicians, thus explaining the absence of certain data. Some protocols were not respected on the scanner due to a lack of equipment, in particular the protocol for the diagnosis of colorectal tumors where no markings were made. All these difficulties limit the generalizability of our results. However, it has the merit of showing the contribution of CT in the diagnosis of abdominal tumor lesions before they are confirmed or invalidated by histology. For reasons of severity, we are going to be much more interested in malignant tumors.

3.2. Age and Gender

The majority of patients were male with a sex ratio of 1.3 without being able to find an explanation. The same observation was made by Diarra in Mali [2] who reported a sex ratio of 1.5 in a study on the epidemiology of digestive cancers in hospitals in Bamako. Oumarou [9] in Bangui obtained the same results with a sex ratio of 1.62 in a study carried out on the contribution of CT in the exploration of abdominal pathologies in Bangui. On the other hand, Nomeharisoa in Madagascar [10] and

Traoré in Mali [11] reported a female predominance in 54.1% and 54.6% of cases, respectively, in their work on the epidemiology of cancers treated in medical oncology at the military hospital of Antananarivo and the epidemiological and anatomopathological aspects of cancers in Mali: data from the cancer registry. This female predominance could be justified by the large proportion of gynaeco-breast cancers in their studies, whereas our study was limited to digestive tumors.

The comparison between age, sex and the different tumors shows that there is no relationship between age and the type of tumors ($p = 0.05$) on the other hand there is a relatively very high risk of developing the three main types of tumors (liver, kidney and pancreas) in female people compared to male people OR, [IC 95%] = 2.6 [1.0 - 7.0], although this difference is not statistically significant.

Also, there is no relationship between age and the appearance of tumor malignancy ($p = 0.3$).

The most represented age group was 51 to 60 years old, which confirms that digestive tumors are the prerogative of the elderly.

3.3. Malignant Tumor Lesions Observed on CT Scan and Contribution of Anatomical Pathology

Liver cancer

Data on digestive cancers in Africa and Europe are somewhat disparate. Our study reported topographically and in descending order 36.6% liver cancer, followed by 7.1% colorectal cancer, 5.3% gastrointestinal cancer, 4.5% pancreatic and kidney cancer, and 3.6% peritoneal cancer (peritoneal carcinomatosis). Our findings are superimposed on those of Kpossou in Benin in 2020 [12] with liver cancers in the lead (38.3%) followed by colorectal cancers (22.8%), gastric cancers (12%) and pancreatic cancers (11.4%). Diarra in Mali [2] found the same lesions but in a different order from ours: stomach cancer (59.1%), followed by liver cancer (19.1%), colorectal cancer (11.2%) and pancreatic cancer (7.1%). In Cameroon, Bang [13] observed different results in his work with colorectal cancer (48.9%) in the lead, followed by pancreatic cancer (19.1%) and gastric cancer (17.9%). Liver cancer accounted for 2.2% of cases. This difference would be linked to the fact that he carried out his study on operable patients.

Liver cancers are among the main cancers in the Central African Republic, this high proportion of liver cancer is correlated with the high prevalence of hepatitis B and C virus infection and the absence of a program to combat viral hepatitis B and C as reported by Bekondi [14] in the Central African Republic. The same observation is made by Nikiema in Burkina Faso [15]. The diagnosis of liver cancer was made in the majority (80.5%) on the basis of CT scan coupled with clinical and biological information (alpha fetoprotein protein) but also and above all on pre-existing liver lesions (cirrhosis). In the rest of the cases (19.5%), a fine-needle-guided ultrasound cyto puncture was performed in the presence of atypical lesions, whose enhancement kinetics after injection did not correspond to the description of HCC or fibrolamellar carcinoma and which were easily accessible to (superficial) cypuncture, *i.e.* no biopsy or cytopuncture could be performed due

to lack of expertise if the lesion was deep. A typical HCC presents on CT as a lesion of more than 2 cm, hypo dense in spontaneous contrast, on a healthy or pathological liver, with intense enhancement in the arterial phase and late lavage [16] whereas fibrolamellar carcinoma presents as a tumor of the young subject, large at the time of discovery, without underlying liver disease, with vascular invasion (more than 80%), frequently located on the left lobe (65%) compared to HCC which is more common on the right lobe. The presence of a central scar is the rule (71% to 95% of cases) [17]. In the studies of Kouame Ngoran [18], all liver cancers have been histologically proven. Interventional radiology has already begun to be practiced in some African countries south of the Sahara [19] [20]. The dominant histological type of liver cancers was hepatocellular carcinoma (5 cases), followed by cholangiocarcinoma (2 cases) and 1 case of metastasis. The same observation is made by Bagny in Lomé *i.e.* most of liver cancer were hepatocellular carcinoma [21].

Colo rectal cancer:

According to previous studies carried out in Bangui, the diagnosis of colorectal cancer is delayed in the majority of cases. Very often (21.4% of cases) the diagnosis was made during an occlusive complication and the role of colonoscopy was mentioned in the diagnosis [4].

Colorectal cancer was the 2nd lesion in order of frequency with 7.1% participation. The diagnosis is often made by colonoscopy, but it is an invasive examination that requires general anesthesia. The water-based colonic scanner has replaced the barium enema and it is a simple and easy examination to perform, especially in elderly subjects in case of suspected colonic cancer [22] [23]. In view of these findings, we can draw the conclusion that the actual frequency of these lesions was probably underestimated, given the conditions of the abdominal CT scan where no markings of the digestive tract were performed. The exploration of the digestive tract in a spontaneous state by the various cross-sectional imaging methods is often made difficult due to the absence of distension of the segment studied. The aim of digestive tract distension techniques (coloCT, enteroCT, gastroduodeno-CT) is to highlight parietal abnormalities in a reproducible way, with the greatest possible precision [24]. The absence of distension of the digestive tract has certainly caused the small parietal tumors to escape, drowned in the faeces. This is all the more true since all the colorectal lesions detected were larger than 3 cm associated with a clinical-radiological picture of occlusive complications.

For colorectal cancers, the analysis of surgical specimens was performed in 2 out of 8 patients, *i.e.* a histological confirmation rate of 25%. This low rate of histological confirmation has also been reported in the work of Kpossou. In our context, it would be linked to a delay in diagnosis, as Ngario has already pointed out in Bangui [4]. While for Kpossou and some authors [12] [25], this could be explained by the fact that the population often buries surgical parts for cultural reasons and also for financial reasons. The histological type found for the two surgical specimens was adenocarcinoma. The same results were obtained in Togo by Darre in 2014 [26].

Pancreatic cancer

For pancreatic cancer, CT is the gold standard in the exploration of pancreatic tumor pathology with a sensitivity of detection that varies between 70% for tumors less than or equal to 2 cm to 98% for tumors larger than 2 cm [27] [28]. In this study, pancreatic cancers were evoked on purely CT basis due to the lack of a technical platform and local expertise in interventional radiology, but in a very evocative clinical and biological context [29]. Kissi in his work in Ivory Coast also diagnosed pancreatic cancers on CT scan basis [30].

These lesions presented on CT scan in the form of a hypodense lesion greater than 2cm, of the head of the pancreas in 4 cases and of the body of the pancreas in 1 case and which does not rise after injection of the contrast agent. For some authors, [31] [32], medical imaging is crucial in the diagnosis of these tumors, the indication of directed aspiration under endoscopic ultrasound (PSEE) is to specify the nature of a solid mass in a "non-obvious" clinical and radiological context, *i.e.* in all cases of diagnostic doubt, in particular in the case of "small" lesions (<2 cm). While other authors insist on the need to take a sample. According to them, the puncture of a solid mass of the pancreas can be performed percutaneously, under ultrasound or computed tomography control, except for lesions of small size or difficult access, which PSEE is recommended [33] [34]. It is therefore imperative for the Central African Republic to strengthen its capacities in terms of interventional radiology.

Cancers gastro intestinaux

Of the 6 gastrointestinal cancers observed on CT scan, 5 presented as a large hypodense, heterogeneous tissue mass with areas of central necrosis with heterogeneous enhancement after injection of the compressive contrast product of the surrounding structures, located under the anterolateral wall of the abdomen, and responsible for a distension of the abdominal cavity, arguing in favor of a gastrointestinal stromal tumor (GIST). They were easily accessible to biopsy puncture performed by pathologists. The histological types found were 4 cases of adenocarcinoma, which is identical to the results of Bolenga Liboko [35].

The only tumor that was not removed was located at the level of the small curvature of the stomach with which it was solidary, with which it shared the same vascularization. The CT scan was characteristic of a GIST (Gastro intestinal stromal tumor).

Peritoneal cancers

Peritoneal tumors (peritoneal carcinosis) presented on CT as nodular thickening or peritoneal masses, associated with fluid effusion. They were observed in patients with malignancies already known (ovarian or pancreatic) at the time of diagnosis.

Indeed, the diagnosis of peritoneal carcinomatosis is easy in diffuse and macronodular forms with ascites. Crude forms are more difficult to diagnose and require targeted research. CT scans allow for better lesion characterization with an etiological approach and an optimal extension assessment [36], it contributes to

the search for direct signs of carcinosis (ascites, epiploic nodules, thickening of the mesentery), indirect signs (digestive, biliary or ureteral compression). It is the most suitable routine examination to explore the anatomical complexity of the peritoneal cavity, especially if it is coupled with PET [37].

4. Conclusion

Digestive cancers occur in adults with a male predominance in Bangui. They are dominated by liver cancers. The involvement of anatomical pathology in the confirmation of lesions suspected by CT scan is still very modest due to the lack of local expertise in interventional radiology. Capacity building for radiology staff is imperative, as is the acquisition of equipment for the smooth running of CT scans.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

References

[1] Hanan, R. And Tahri, A. (2009) Épidémiologie des cancers digestifs au CHU Mohammed VI de Marrakech: 2003-2007. Thèse de doctorat en Médecine, Marrakech, Faculté de médecine et de Pharmacie de Marrakech.

[2] Diarra, M., Konate, A., Traoré, C., Souckho-Kaya, A., Diarra, C., Doumbia-Samaké, K., *et al.* (2012) Épidémiologie des cancers digestifs en milieu hospitalier à Bamako. *Hegel*, **1**, 12-22. https://doi.org/10.3917/heg.021.0012

[3] Salamatou, M.G., Hinde, H., Abdelmadjid, S. And Ali, Q. (2014) Les cancers digestifs au Niger. Fréquence relative sur une étude rétrospective de 1992 à 2009. *European Scientific Journal*, **10**, 339-349.

[4] Nghario, L., Doui Doungba, A., Issa Mapouka, P.A., Kobondit, D., Koffi, B. and Mali, N.M. (2011) Aspects diagnostiques et thérapeutiques des cancers colorectaux à l'Hôpital de l'Amitié, Bangui. *Revue Africaine de Chirurgie et Spécialités*, **2**, 21-29.

[5] Aubry, P. and Gauzère, B.A. (2023) Les cancers dans les pays en développement, Actualités 2023. https://www.medecinetropicale.com

[6] Aubry, P. and Gauzère, B.A. (2018) Les cancers dans les pays en développement. *Tropical Medicine*, **16**, 1-8.

[7] Camengo Police, S.M., Service, G., Philomène Boua-Akelelo, N., N'guilé, D., Elowa, B., Mobima, T., *et al.* (2020) The Epidemiological, Clinical, Biological and Morphological Characteristics of Primitive Liver Cancers in Bangui. *Open Journal of Gastroenterology*, **10**, 97-105. https://doi.org/10.4236/ojgas.2020.104010

[8] Kouandongui, F., Kobelembi, A., Djabanga, C., Tapiade, C.E., Ouaimon, M. and Mobima T. (2019) Diagnostic d'un carcinome hépatocellulaire à l'échographie à Bangui. *Journal africain de l'imagerie médicale*, **11**, 255-260.

[9] Youssouf, O., Kouandongui Bangue, S.F., Mobima, T. and Wango Ndoizine, B.C. (2023) Contribution du Scanner à L'exploration des Pathologies Abdominales à Bangui. *European Scientific Journal*, **19**, 191-201. https://doi.org/10.19044/esj.2023.v19n33p191

[10] Hasiniatsy, N.R.E., Ramahandrisoa, A.V.N., Refeno, V., Rakoto, F.A. and Rafaramino, F. (2017) Épidémiologie des cancers pris en charge en oncologie médicale à l'hôpital militaire d'Antananarivo, Madagascar. *Bulletin du Cancer*, **104**, 902-904.

https://doi.org/10.1016/j.bulcan.2017.07.006

[11] Traore Bourama, O. (2009) Aspects épidémiologiques et anatomopathologiques des cancers au Mali: Données du registre des cancers. Thèse de doctorat en Médecine, Bamako, Université de Bamako.

[12] Kpossou, A. (2020) Épidémiologie des cancers digestifs primitifs de l'adulte dans trois centres sanitaires spécialisés de Cotonou (République du Bénin). *Bulletin de la société de pathologie exotique*, **113**, 254-257. https://doi.org/10.3166/bspe-2020-0152

[13] Bang, G.A., Djopseu, L.K., Beugheum Chasim, C., Bwelle Moto, G., Savom, E.P., Ekani Boukar, Y.M., *et al*. (2021) Cancers Digestifs Opérés au Cameroun: Typologie et Stadification au Moment du Diagnostic. *Health Sciences and Diseases*, **22**, 11-15.

[14] Bekondi, C., Mobima, T., Ouavènè, J.O., Koffi, B., Konamna, X., Béré, A., *et al*. (2010) Étiopathologie du carcinome hépatocellulaire à Bangui, République centrafricaine: Caractéristiques cliniques, biologiques et aspects virologiques des patients. *Pathologie Biologie*, **58**, 152-155. https://doi.org/10.1016/j.patbio.2009.07.027

[15] Zakari, N., Appolinaire, S., Gilberte, K. and Rabiou, C. (2011) Carcinomes hépatocellulaires en milieu africain burkinabè: Contribution de l'échographie à propos de 58 cas. *Pan African Medical Journal*, **7**, 1-10. https://doi.org/10.4314/pamj.v7i1.69116

[16] Lin, M., Chen, C., Wang, C., Cheng, Y., Eng, H., Wang, J., *et al*. (2011) Diagnostic Sensitivity of Hepatocellular Carcinoma Imaging and Its Application to Non-Cirrhotic Patients. J*ournal of Gastroenterology and Hepatology*, **26**, 745-750. https://doi.org/10.1111/j.1440-1746.2010.06501.x

[17] Hichem El Azhari Benmamar, H.E.B. (2023) Contribution de l'imagerie dans le diagnostic positif du carcinome hépatocellulaire. *Algerian Journal of Medical and Health Research*, **2**, 26-43.

[18] Nikiema, Z., Manewa Fotso, S., N'goan-Domoua, A.M. and N'gbesso, R.D. (2017) Les aspects tomodensitométriques et le profil épidémio-clinique des tumeurs du foie en Afrique subsaharienne. *Journal Africain de l'Imagerie Médicale*, **9**, 8 p.

[19] Touré, P.S., Léye, A., Diop, M.M., Gueye, M.D., Léye, Y.M., Berthé, A., *et al*. (2014) La ponction biopsie hépatique à Dakar: Indications, complications et apport diagnostique—A propos de 70 cas. *Pan African Medical Journal*, **17**, Article 85. https://doi.org/10.11604/pamj.2014.17.85.2703

[20] Gnaoulé, D.T., Gui-Bilé, L.N., Ohui-Ako, E., Dédé, N.S., Diabaté, A.S. and Yapo, Y.P. (2022) Approche diagnostique en imagerie en coupes (échographie et tomodensitométrie) des tumeurs rénales malignes chez l'enfant au service d'oncologie pédiatrique du chu de Treichville Abidjan. A propos de 43 cas. *Journal de Radiologie et de Médecine Nucléaires d'Afrique*, **1**, 129-36.

[21] Bagny, A., Bouglouga, O., Darre, T., Lawson-Ananissoh, L.M., Kaaga, Y.L., Sonhaye, L., *et al*. (2015) Profil épidémiologique et diagnostique des cancers digestifs au CHU Campus de Lomé: A propos de 250 cas. *Journal Africain d'Hépato-Gastroentérologie*, **9**, 80-84. https://doi.org/10.1007/s12157-015-0594-8

[22] Ridereau-Zins, C., Aubé, C., Dib, N., Pessaux, P., Pilleul, F., Dumortier, J., *et al*. (2006) Le coloscanner a l'eau: Une technique performante pour le diagnostic des cancers coliques. *Journal de Radiologie*, **87**, Article 1395. https://doi.org/10.1016/s0221-0363(06)87367-1

[23] Boudghene, F. (2012) Imagerie nouvelle du cancer du côlon: A l'eau et à l'air. *Sănătate Publică, Economie şi Management în Medicină*, **43**, Article 105.

[24] Mathias, J., Barbary, C., Meyer-Bisch, L., Tissier, S., Laurent, V., Beot, S., *et al*. (2005) L'eau et les hydrosolubles iodés comme contrastes endoluminaux en scanographie du tube digestif. *Feuillets de Radiologie*, **45**, 273-287. https://doi.org/10.1016/s0181-9801(05)80602-5

[25] Gnangnon, F., Kpossou, A.R. and Alaladé, M. (2018) Prise en charge des présumés cancers digestifs primitifs de l'adulte au centre hospitalier universitaire départemental de l'Ouémé-Plateau de Porto-Novo. *Annales de l'université de Parakou*, *Série* «*Sciences de la Santé*», **8**, 25-28.

[26] Darré, T., Amégbor, K., Napo-Koura, G., Bagny, A., Bouglouga, O., Lawson, A.L., *et al*. (2014) Profil histo-épidémiologique des cancers colorectaux au Togo. *Journal Africain d'Hépato-Gastroentérologie*, **8**, 226-229. https://doi.org/10.1007/s12157-014-0568-2

[27] Lagadec, M., Fayard, C., Jules Boulay Colette, I., Vulierme, M.P. and Zins, M. (2011) Imagerie pré-thérapeutique du cancer du pancréas à l'heure de la tumeur «borderline résécable».

[28] Zins, M., Petit, E., Boulay-Coletta, I., Balaton, A., Marty, O. and Berrod, J.L. (2005) Imagerie de l'adénocarcinome du pancréas. https://www.em-premium.com/article/138821

[29] Buscail, L., Bournet, B. and Cordelier, P. (2012) Le cancer du pancréas. *Bulletin de l'Académie Nationale de Médecine*, **196**, 1819-1828. https://doi.org/10.1016/s0001-4079(19)31657-7

[30] Kissi Anzouan-Kacou, H.Y., Doffou, S.A., Bangoura, A.D., Kouamé, D.H., Fanou, C.D., Bathaix, Y.F., *et al*. (2016) Prise en charge des cancers digestifs en Côte-d'Ivoire: Expérience du service d'hépatogastroentérologie du CHU de Yopougon. *Journal Africain d'Hépato-Gastroentérologie*, **11**, 13-18. https://doi.org/10.1007/s12157-016-0699-8

[31] Palazzo, L. (2003) Biopsie écho-endoscopiquement guidée: Quand est-elle irremplaçable? *Gastroentérologie Clinique et Biologique*, **27**, 79-85.

[32] Pujol, B. (2004) Ponction sous échoendoscopie. http://www.fmcgastro.org

[33] Qian, X. and Hecht, J.L. (2003) Pancreatic Fine Needle Aspiration. *Acta Cytologica*, **47**, 723-726. https://doi.org/10.1159/000326595

[34] Mallery, J.S., Centeno, B.A., Hahn, P.F., Chang, Y., Warshaw, A.L. and Brugge, W.R. (2002) Pancreatic Tissue Sampling Guided by EUS, CT/US, and Surgery: A Comparison of Sensitivity and Specificity. *Gastrointestinal Endoscopy*, **56**, 218-224. https://doi.org/10.1016/s0016-5107(02)70181-8

[35] Bolenga Libiko, A.F., Dagnagnéwendé, D., Ndingossoka, R.J., Rissia, F. and Ndounga, E. (2022) Aspects cliniques et histologiques des cancers de l'estomac au Centre Hospitalier et Universitaire de Brazzaville. *Health Sciences and Disease*, **23**, 63-68.

[36] Taourel, P., Baud, C., Lesnik, A., Le Guen, V., Pujol, J. and Bruel, J.M. (2004) Le péritoine acteur de la pathologie abdominale. *Journal de Radiologie*, **85**, 574-590. https://doi.org/10.1016/s0221-0363(04)97632-9

[37] El Hajjam, M., Desperramons, J., Chagnon, S. and Lacombe Boulogne, P. (2009) Imagerie de la carcinose peritonéale. *Journal de Radiologie*, **90**, 1484. https://doi.org/10.1016/s0221-0363(09)75806-8