Volume 1
Issue 4
March 2024

UNI DIGEST

"Pathology Chronicles: Where Curiosity and Discovery Intersect"

Happy Holi!

"Discovery Expedition: Unraveling the Wonders Hidden in Pathology"

EDITOR'S COLUMN

Welcome to the **4th edition of UNIDIGEST**, our scientific newsletter. It covers all about the latest updates in cutting-edge diagnostic information, expert insights, and a glimpse into the advanced assays. In this edition, we shall be talking about the genetic abnormalities in multiple myeloma, importance of Colistin susceptibility and the growing role of immuno-histochemistry in correct diagnosis.

At **Unipath Specialty Laboratory**, we're always working hard to make diagnostics better. Our expert professionals contribute their expertise, offering views that illuminate the intricacies of these diagnostic innovations. UNIDIGEST is your gateway to staying informed on the forefront of diagnostic excellence. From predictive genetic testing to personalized medicine, we explore assays that not only diagnose but pave the way for targeted and individualized treatment plans. The future of diagnostics is unfolding before our eyes, and **UNIDIGEST** is your guide to navigating this exciting frontier.

Please feel free to read, ask questions, and tell us what you think. Your feedback helps us make better newsletters in the future. Thanks for being part of this journey with us! *Wishing you a very happy and safe Holi* , filled with more learning and discovery in the world of science and healthcare.

Happy Reading & Cheers!

Warm regards,
Dr. Jwalant Shah, MD & CEO
Unipath Specialty Laboratory, Ahmedabad

EDITOR'S NOTE

Greetings and welcome to the **4th edition of UNIDIGEST** – your trusted gateway to the latest updates and insights in to the dynamic field of diagnostics. In this edition, we embark on an exciting journey through cutting-edge technologies , thought-provoking case reports, and emerging trends that shape the future of diagnostics.

In this issue, we talk about ***' Enhanced sensitivity for detection of genetic abnormalities in multiple myeloma- by CD138 enrichment for FISH'***. Detection of high-risk cytogenomic abnormalities by fluorescence in situ hybridization improves risk stratification of patients with plasma cell neoplasms. The correct methodology to perform ***'Colistin Susceptibility Test'*** is discussed. Colistin is one of the last therapeutic options for infections with multidrug-resistant Gram-negative bacteria. Consequently, accurate & reliable testing of colistin susceptibility has become essential for clinical laboratories worldwide.

As guardians of scientific progress, we recognize the pivotal role an assay plays in shaping the future of healthcare. From precision medicine to innovative technologies, **UNIDIGEST's** endeavor is to be your guide in navigating the exciting terrain of futuristic diagnostics. As we continue this scientific journey, we renew our vow to uphold the highest standards of integrity, accuracy, and relevance, paving the way for a brighter and healthier future.

We extend our gratitude to the contributors, experts, and readers. We value your engagement and feedback. Join us in this exploration of dynamic fields, and share your questions, insights, and suggestions.
Wishing You A Very Happy Holi!

Warm regards,
Dr. Ravi Gaur, MD
Chairman Medical Advisory Committee
Unipath Specialty Laboratory, Ahmedabad

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READ MORE

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Enhanced sensitivity for detection of genetic abnormalities in multiple myeloma- by CD138 enrichment for FISH

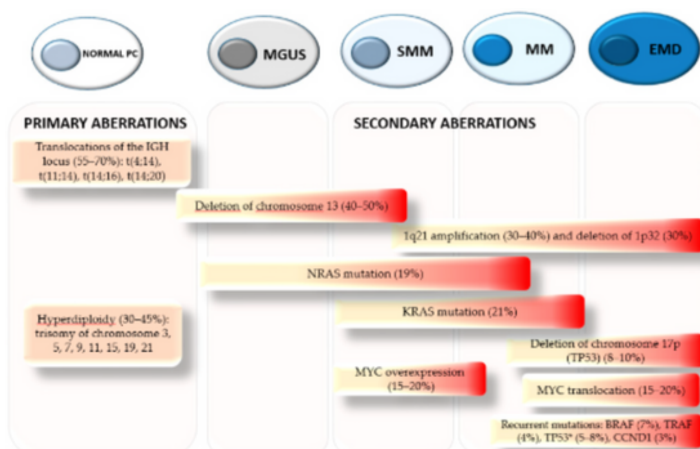
Dr Nutan Badgujar (Ph.D in Biotechnology)
Scientific Officer, Cytogenetics Deptt, Unipath Specialty Laboratory, Ahmedabad

INTRODUCTION

Multiple myeloma is a haematological neoplasm of plasma cells, characterized by marrow involvement and bone destructions. It clinically presents as hypercalcemia, abnormal clonal proliferation of plasma cells that may result in focal bone lesions, renal failure and anaemia. Systemic involvement of the disease can be as polyneuropathy, organomegaly, endocrinopathy, systemic light chain amyloidosis. Multiple myeloma evolves from a clinically silent premalignant stage termed monoclonal gammopathy of undetermined significance (MGUS). Plasma cell dyscrasia includes MGUS, smouldering multiple myeloma (SMM), multiple myeloma (MM) and plasmacytoma. Disease biology in multiple myeloma is best reflected based on the molecular subtype of the disease and the presence or absence of specific cytogenetic abnormalities.

Cytogenetic analysis plays a key role in prognostication as well as in disease management. Prompt diagnosis is essential because timely treatment significantly impacts outcomes and patient quality of life. Metaphase cytogenetic analysis (karyotype analysis) often fails to detect genomic abnormalities in multiple myeloma owing to the low proliferation rate of plasma cells. Plasma cell enrichment methods enhances detection of cytogenetic abnormalities by Fluorescence In Situ Hybridization (FISH) and improves risk stratification of patients in myeloma.

STAGES OF PLASMA CELL DYSCRASIA WITH PRIMARY AND SECONDARY GENETIC EVENTS:



Reference: Burroughs Garcìa, Jessica, et al..2021

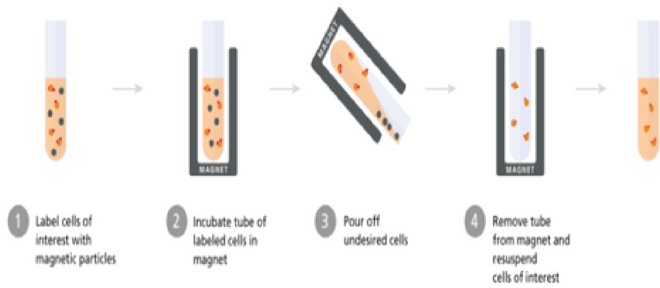
FISH in Multiple Myeloma - CD 138 enrichment enhances sensitivity of FISH analysis

Fluorescence in situ hybridization (FISH) has become an important diagnostic tool in the characterization of multiple myeloma. It is a sensitive and currently the most effective technique, that can detect chromosomal aberrations in multiple myeloma. FISH analysis can be performed on interphase (iFISH) cells circumventing the difficulty of slow plasma cell proliferation in metaphase cytogenetics analysis.

The plasma cells in bone marrow samples for FISH testing are sorted by CD138 enrichment using magnetic beads. Magnetic activated cell sorting (MACS) method allows purification of selected cell populations using specific antibodies and magnetic beads. The CD138 antigen is present on all plasma cells (both normal and malignant) making it a suitable selection marker for the isolation of multiple myeloma cells. Enrichment of plasma cells by CD138 positive selection can therefore enhance the sensitivity of downstream FISH analysis even with low plasma cell count. It is highly effective technique, thus enhancing the abnormality detection rate.

Magnetic cell separation (MACS) technique involves placing a tube filled with a magnetically-labelled sample within a magnetic field. The magnetically-labelled target cells will migrate towards the magnet and will be immobilized at the sides of the tube. The unlabelled cells in suspension can then be poured or pipetted off to separate them from the labelled cells. Upon removing the tube from the magnet, the labelled cells are released from the sides of the tube. The labelled cells are the cells of interest and can be used in downstream applications.

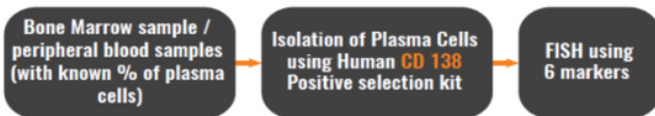
At cytogenetic department of Unipath specialty laboratory we follow following algorithm: 1) Bone marrow sample is used for CD 138 enrichment as well as culture study by 72 hours of incubation. Sufficient volume of BM sample is desired for both tests. Fresh BM sample at ambient temperature and received within 24 hours is recommended. 2) Peripheral blood sample is used only when patient is suffering from plasma cell leukemia and having sufficient amount of plasma cells in circulation.



Use of CD 138 enrichment has improved our abnormality detection rate significantly. We have used FISH probes designed to detect t(11;14), t(4;14), t(14;16), deletion 17p, deletion 13q and abnormalities of chromosome 1(1q gain/amp and 1p deletion).

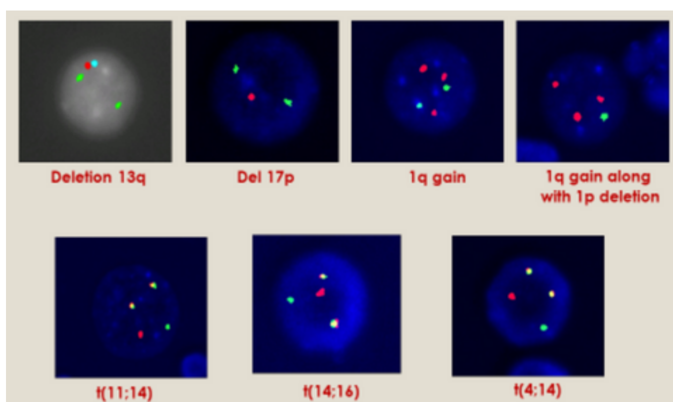
Our final report is based on (provided sample is sufficient) karyotype analysis with 72 hour culture (which has better culture yield) and FISH analysis by six common prognostic markers.

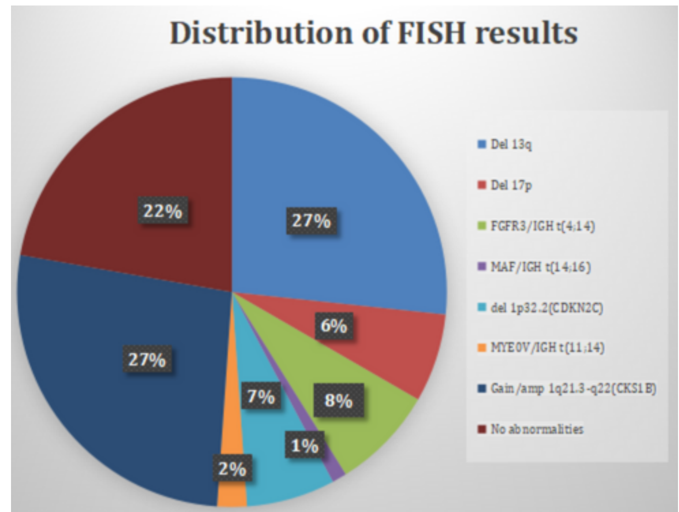
Algorithm:



At Unipath, retrospective analysis of samples received for multiple myeloma FISH between 1st Nov to 31st Dec 2023 (2 months) was done. Total 70 samples were processed. Out of 70 cases, 71.43% were showing either single abnormality or in combinations of two or more. Double-hit MM refers to the presence of any two or more high-risk abnormalities and triple-hit MM refers to the presence of three or more high-risk abnormalities. In our study, 5.71% (4 patients) had double hit MM and 1.42%(1 patient) had triple hit MM.

In house, at cytogenetic department, we have already seen an advantage of using FISH for MM on CD138 enriched plasma cells. FISH can be performed on cultured plasma cells also. However, this depends on presence of plasma cell numbers in sample. Till date from 1st January,2022 by using CD138 enrichment FISH process, we have delivered results for almost 1000 clinical samples. Analysis and scoring is carried out by certified technologist in a blinded fashion. Results are reviewed by reporting doctors. The final report has a narrative description of results.





Gains and losses of markers used in FISH give important clue for presence of hyperdiploid ,near tetraploid or hypodiploid clone.

Probe Used	Cytogenetic abnormality	
DLEU/LAMP1 gene on chromosome 13	Deletion or monosomy 13	24(34.28%)
Chromosome 1p(CDKN2A gene)/1q (CKS1B gene)	Chromosome 1q gain/amplification	24(34.28%)
	Chromosome 1p loss	6(8.57%)
t(11;14) or MYEOV::IGH	t(11;14)(q13;q32)	2(2.85%)
	Trisomy 11	18(25.71%)
Deletion 17p(TP53 gene)/11q (ATM gene)	Deletion 17p (TP53 loss)	6(8.57%)
	ATM loss	2(2.85%)
t(14;16) or IGH::MAF	t(14;16)(q32;q23)	1(1.42%)
	Loss of MAF/gain of MAF	3(4.28%)/4(5.71%)
t(4;14) or FGFR3::IGH	t(4;14)(p16;q32)	7(10.0%)
	FGFR3 gain	3(4.28%)
IGH Break Apart	IGH rearranged	1(1.42%)
No abnormalities	--	20(28.57%)

n=number of patients, *Gain means 3 copies of Chromosome 1q and amplification means 4 or more copies of chromosome 1q

RISK STRATIFICATION AND DISEASE ASSESSMENT IN MM:

In summary, cytogenetic abnormalities detected on standard FISH testing are of significant value in classification, risk stratification and management of patients with plasma cell dyscrasias. Accurate detection and interpretation not only assists in counselling patients regarding anticipated outcome but also helps in choice of drugs and in selecting overall therapeutic strategy.

Cytogenetic factors considered as high risk for progression/relapse (NCCN guideline 2024)

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HOW TO TEST AND PERFORM COLISTIN SUSCEPTIBILITY TEST?

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INTRODUCTION:

Because of the growing importance and urgent need to define an optimal, user-friendly method for susceptibility testing for colistin, there is urgent need to identify the right technique for reporting colistin susceptibility to clinician. This article deals with presentation of different methods of MIC testing methods, i.e., broth macrodilution, broth microdilution, agar dilution techniques, and gradient MIC strip method. Increased antimicrobial resistance among clinically important Gram-negative bacilli (GNB) has renewed interest in colistin as a therapeutic option (Falagas et al, 2010). Colistin has often become the last option to treat severe infections. Antimicrobial susceptibility pattern tests are performed on microorganisms isolated from samples collected from patients. The results are also useful for surveillance of drug resistant organisms, epidemiological studies, and comparisons of new and existing agents. Studies of minimum inhibitory concentrations (MICs) of antimicrobial agents are used in resistance surveillance, to compare actions of new agents, and especially useful to reach at conclusion of susceptibility of isolates giving equivocal results in disc diffusion tests. It is also useful to determine the susceptibility of organisms where disc tests may be unreliable as well as for requirement of quantitative analysis for clinical management.

Hurdles in utility of disc diffusion method and interpretation:

Colistin readily adheres to the plastics used for Broth Micro dilution (BMD) panels, an effect that is most apparent at low concentrations of the drug. (Karvanen2011). Addition of a surfactant (polysorbate 80- Tween 80), can decrease the adsorption of colistin to polystyrene. It can be added to the inoculum or to cation-adjusted Mueller-Hinton broth (CAMHB).

Dilution tests:

In dilution tests microorganisms are tested for their ability to produce visible growth on a series of agar plates (agar dilution) or in broth (broth dilution) containing dilutions of the antimicrobial agent. The lowest concentration of an antimicrobial agent (in mg/L) that, under defined in vitro conditions, prevents the appearance of visible growth of a microorganism within a defined period of time is known as the MIC. The MIC aids treatment decisions.

Requirement of dilution tests:

Medium: Isolated pure culture is growing in Mueller-Hinton broth. Mueller-Hinton broth (Cation-supplemented) is for broth dilution methods. Don't add supplements otherwise required.

Antimicrobial agents: Pure antimicrobial powders store in sealed containers in the dark at 4 °C with a desiccant.

Prepare concentrations of stock solutions:
1000 mg/L. Sterilization of solutions is not required.
Stock solutions are to be stored in aliquots at −20 °C or below. Colistin is soluble in water.

Examples of Antimicrobial agent / Solvant/ Diluent:

- Amoxycillin, Ampicillin, Cefepime, Clavulanic acid, Sulbactam, Ticarcillin, Cephalothin: Phosphate buffer 0.1 m, pH 6.0
- Azithromycin, Erythromycin, Fusidic acid, Chloramphenicol : Ethanol 95%
- Aztreonam, Ceftazidime, :Saturated sodium bicarbonate solution.
- Imipenem, Meropenem : Phosphate buffer 0.01 m, pH 7.2

Broth dilution: A minimum of 1 mL of each dilution per tube or vial is required for the test. A two-fold dilution series up and/or down from 1 mg/L is useful. Use up to 5–8 dilutions to cover a therapeutically achievable range for each agent.

Breakpoint MIC testing: It is a modification where the concentrations of the agent tested are restricted to the breakpoint concentrations (Susceptible, Intermediate or Resistant).

Broth micro-dilution: Commercial manufacturers offer micro-dilution plates with agents dried into the wells. Final concentrations can be achieved after reconstitution with broth suspension of the organism.

Broth Macro-dilution:

Preparation of inoculum: The inoculum may be prepared by diluting a broth culture / by emulsifying overnight colonies from an agar medium in broth (Tryptic soy broth or brain heart infusion). Incubate at 35°C –37 °C until the growth reaches a turbidity equal to or greater than that of a 0.5 McFarland standard (approximately 1.5 × 108 cfu/mL). When it is mixed with an equal volume of antimicrobial solution in tubes or well, will result in a final inoculum of 5 × 105 cfu/mL. Transfer 50 μL of the 0.5 McFarland organism suspension to 10 mL of broth.

Viable counts can be done by removing 10 µL from the growth control well or tube immediately after inoculation and diluting it in 10 mL of broth or saline. 100 µL of this dilution is spread over the surface of a agar plate, incubated overnight. Fifty colonies would be expected.
Incubation: 35 °C to 37 °C in air for 16–20 h.

Reading results: The amount of growth in each tube or well is compared with that in the positive growth control and the MIC recorded as the lowest concentration of the agent that completely inhibits growth.

Standard ATCC strains:

- Escherichia coli ATCC 25922 NCTC 12241 CIP 76.24 DSM 1103
- Escherichia coli ATCC 35218 DSM 5564
- Pseudomonas aeruginosa ATCC 27853 NCTC 12934 CIP 54.127 DSM 1117
- Staphylococcus aureus ATCC 29213 NCTC 12973 CIP 103429 DSM 2569
- Enterococcus faecalis ATCC 29212 NCTC 12697 CIP 103214 DSM 2570

Testing for Colistin: International committees (a EUCAST/CLSI joint working group) concluded that broth micro-dilution (BMD) should serve as the reference method for testing susceptibility to colistin/polymyxin compounds. (Range: 0.064 µg/ml to 64 µg/ml in 2-fold dilutions).

Procedure: A 1,000-µg/ml stock solution of reagent-grade colistin sulfate (Sigma) is to be prepared fresh in sterile deionized water and prepare two-fold dilutions of colistin:

- 0.12 to 8.0 µg/ml for micro dilution methods.
- 0.06 to 16 µg/ml for tube dilution method
- 0.25 to 16 µg/ml for agar dilution.
- Etest strips: 0.25 to 4.0 µg/ml

The final concentration of organisms: 3 × 105 to 5 × 105 CFU/ml.

Incubation: for 16 to 20 h at 35°C in ambient air, examine visually by two independent observers.

Quality control:
Escherichia coli ATCC 25922 and E. coli NCTC 13846
P. aeruginosa ATCC 27853 (CLSI,2012)

Interpretation: Susceptible ≤2 µg/ml, Resistant ≥4 µg/ml. With colistin, it is essential to report correct results and good essential agreement.

Important note: Disks could not discriminate between colistin susceptible and resistant isolates. False susceptible results (very major errors) were mainly obtained for P. aeruginosa. Neither EUCAST nor CLSI have introduced an intermediate category. It is advisable for laboratories not to trust colistin gradient tests or disk diffusion and to use broth microdilution methods for this purpose. Adding further complexity to MIC testing is the as-yet poorly understood phenomenon of hetero-resistance, which essentially refers to the presence of a subpopulation of colistin-resistant bacteria within an apparently susceptible bacterial population (Lo-Ten-Foe et al, 2007).

Broth Micro-dilution: Bacterial inoculum of 5 × 105 CFU/ml in cation-adjusted Mueller-Hinton broth is useful for broth MIC testing. Briefly, serial two-fold dilutions were prepared in CAMHB ranging from 0.125 to 256 µg/ml colistin concentrations. 0.05 ml of each dilution is to be distributed over a 96-well polystyrene microwell-plate.

Agar dilution: Mueller-Hinton agar containing 0.125–256 µg/ml colistin is to be prepared in 90-mm plates in triplicate. There is no effect on MIC due to storage of colistin-containing agar plates for 7 days at 4 °C (Agata Turlej-Rogacka, 2018). Agar dilution is a reliable and reproducible method for colistin MIC determination, even when plates are stored for 1 week at 4 °C. Agar dilution is superior in terms of reproducibility and robustness, compared to broth dilution methods, for colistin MIC determination (Agata Turlej-Rogacka, 2018). A 0.5 McF suspension is to be diluted 1:10 of which 2 µl inoculated on the prepared plates resulting in a final bacterial inoculum of 1 × 104 CFU/spot. In order to check for the solubility and distribution of colistin in agar plates, strains to be spotted on different regions of the plate. Each clinical strain and the two reference strains are to be spotted on 6 and 5 different locations, respectively.

MIC gradient strips: There are problems in performing in vitro colistin susceptibility testing. Agar dilution and broth dilution are cumbersome to perform and impractical to implement as routine tests in many clinical laboratories (8, 14). (Gales, A. C., et al, 2001, NCCL, 2003). The E-test has been reported as a simple and accurate alternative method for determining the antimicrobial susceptibilities of various microorganisms. Here a 0.5 McF suspension is to be spread on Mueller-Hinton agar. Colistin MIC gradient strip is to be applied. Reading is done at the point of complete inhibition of all growth, including hazes.

There is agreement (16.5%) within 1 twofold dilution between the E-test and the broth microdilution, complete agreement for the strains for which MICs fell within the range of 0.25 to 1 µg of colistin/ml. (L. A. Arroyo, 2005). The poor agar diffusion characteristics of colistin limit the predictive accuracy of the disk diffusion test and consequently values of 12-13 mm should be confirmed with MIC determination by Etest or broth dilution method. Colistin exhibited excellent activity against Acinetobacter baumannii and Escherichia coli isolates, and P. aeruginosa Irene Galani , et al, 2008). It is less active both against Enterobacter spp. and Klebsiella pneumonia, poor activity against Stenotrophomonas maltophilia. Some author (Surojit Das, et al, 2020) make opinion that E-test are unreliable.

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CASE REPORT : HISTOPATHOLOGICAL & IMMUNO HISTOCHEMICAL STUDIES OF A TYPICAL CASE OF INTRA DUCTAL PAPILLARY CARCINOMA OF A MALE BREAST

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THE INTRODUCTION

Breast carcinoma in men is extremely rare; it represents 0.6% of all breast carcinomas and less than 1% of all malignancies in men. [1]. Intraductal papillary carcinoma (IPC) is also a rare form of breast cancer, accounting for 0.5–1% of all breast cancers [2]. IPC in man is an extremely rare disease with only very few case reports published in the literature so far [3-5]. IPC accounts for 5 to 7.5% of all male breast cancers [6]. It typically occurs at an old age with a good prognosis [7]. Intraductal papillary carcinoma is a rare form of malignant breast disease, which constitute about 0.5% to 1% of all breast cancers.

Papillary carcinomas can be classified into intraductal and intracystic papillary carcinoma as per histopathological evaluation. It has been found that the incidence and prevalence of both invasive and in situ papillary carcinoma is greater in postmenopausal elderly women, and in males. Clinically, the patient is asymptomatic or present with a breast mass with or without nipple discharge. In radiological investigations, intraductal papillary carcinoma has present mostly with benign features. Histological examination shows a well circumscribed mass lesion having proliferation of neoplastic cells arranged around fibrovascular cores. From therapeutic as well as prognostic points distinction of invasive papillary carcinoma from non-invasive forms is very important.

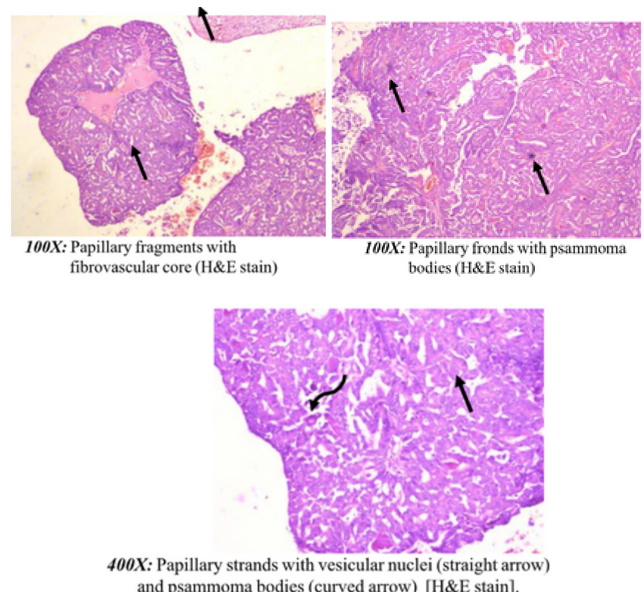
Papillary neoplasm of breast encompasses a heterogeneous group of lesions in histomorphology, all sharing a growth pattern characterized by the presence of fibro vascular stalks lined by neoplastic epithelial cells. Malignant papillary neoplasms of the breast consist of a number of microscopically distinct lesions including ductal carcinoma in situ (DCIS) arising in an intraductal papilloma, papillary DCIS, encapsulated papillary carcinoma, solid papillary carcinoma and invasive papillary carcinoma.

CASE REPORT

A 61 year old man presented with a mass in the upper outer quadrant of the left breast, with associated nipple discharge and bleeding since 2 months. On physical examination one 2 cm diameter mass noted with ill-defined margins. The lesion is fixed and firm but painless, and without any skin changes. Mammography showed an oval opacity of the upper outer quadrant with calcifications.

Ultrasonography showed a solid-cystic mass measuring 27 mm, with posterior acoustic enhancement. FNAC had done revealed nuclear atypia. Surgical excision was carried out. Histological examination revealed tumor cells arranged in multi-cell layered papillae mostly in dilated lumen with foci of cribriform, follicular and solid pattern. Occasional psammoma bodies are also noted.

There is no evidence of microscopic invasion or lympho vascular invasion or involvement of any of the ten axillary nodes dissected (0/10). Nipple and areola as well as posterior resection margin are not involved (Figures 1 and 2).



100X: Papillary fragments with fibrovascular core (H&E stain)

100X: Papillary fronds with psammoma bodies (H&E stain)

400X: Papillary strands with vesicular nuclei (straight arrow) and psammoma bodies (curved arrow) [H&E stain].

Figure 1. Histological examination revealed tumor cells arranged in multi-cell layered papillae.

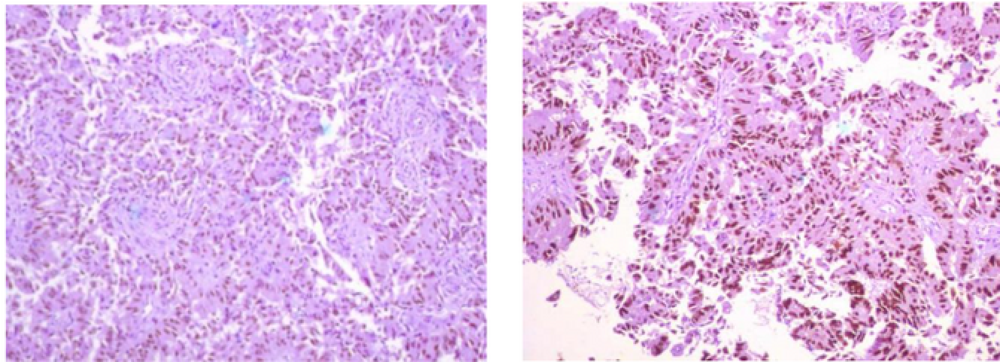


Figure 2. *Immunohistochemical findings reveal strong positivity for ER and PR. Allred scoring show high intensity (3) and proportion (5) score for both ER and PR.*

Discussion

Papillary carcinoma of the breast is a rare form of malignant tumor, constituting 1-2% of all breast carcinomas in women. It is characterized by the papillary architecture with proliferation of neoplastic cells forming finger-like projections or fronds having central fibrovascular cores covered by epithelium without myoepithelial cell layer. Presence of myoepithelial cells differentiate between benign and malignant papillary lesion. Lesions can be divided into invasive and non-invasive forms. Non-invasive papillary carcinomas are subdivided further into two subtypes, a diffuse form the papillary variant of ductal carcinoma in situ and a localized form- intracystic papillary carcinoma. In mammography, the intraductal papillary carcinoma is seen as a round to oval or lobulated opacity.

The margins of the mass lesions are usually circumscribed but in some cases indistinct or obscured margins are also found in places indicating presence of inflammation or invasion. The co-existence needle aspiration cytology is a strong indicator of carcinoma.

Many authors use core needle biopsy of the intraductal mass under ultrasonographic guidance as a distinguishing tool between benign from malignant papillary lesions, but it has got a low accuracy for identifying in situ or invasive papillary carcinoma because the site of biopsy is generally central where the invasion is usually found at the periphery of the tumor mass. Surgical excision is the standard recommendation after core-needle biopsy if there is atypia, any high-risk lesion, positivity for malignancy, or imaging-histological discordance. Excision biopsy is often performed, when papillary carcinoma is suggested by mammography or sonography. Surgical excision allows the pathologist to classify the papillary lesions by conventional histological examination aided with immuno histochemical study and to demonstrate invasion or DCIS in surrounding breast tissue, present in majority of cases.

There are no strict evidence based guidelines for treatment of intraductal papillary carcinoma. Randomized controlled trials comparing outcome of breast conserving surgery to mastectomy is also not very promising. There are also many case reports as well as retrospective studies that showed excellent prognosis with conservative surgery without dissection at axillary part. In this context, we believe this paper will enlighten all concern about the extremely rare Intraductal Papillary Carcinoma of a male breast.

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"CHROMATOGRAPHY OF LIFE: EXPLORING THE VIVID PALETTE OF HOLI & PATHOLOGY"

In an unexpected union of tradition and science, the festival of colors, Holi, finds resonance in the intricate world of pathology. Both celebrations of life, these seemingly distinct realms share a vibrant tapestry that connects the hues of cultural festivities with the diagnostic palette of pathology.

The Spectrum of Diversity: Holi, with its kaleidoscope of colors, mirrors the diverse spectrum of human experiences celebrated in pathology. Each color signifies a different facet of life, much like the varied manifestations of health and disease encountered under the microscope.

Diagnostic Pigments: Just as Holi powders are carefully crafted to produce a spectrum of colors, pathology stains are meticulously chosen to bring out the nuances of cellular structures. The staining process becomes an art form, akin to the preparation of vibrant hues for the festive revelry.

The Alchemy of Diagnosis: Just as Holi celebrates the alchemy of colors blending and merging, pathology is the alchemy of diagnosis — blending clinical acumen with scientific expertise. Both endeavors seek to decipher the ever-shifting patterns that define the canvas of life.

In this exploration, **Holi and pathology** intertwine as celebrations of life's vibrancy, one through the ***exuberance of colors*** and the other through ***the revealing lens of science***. Together, they form a narrative that transcends boundaries, inviting us to witness the harmonious dance of tradition and diagnosis in the grand festival of existence.

Unipath Specialty Laboratory: Emerging Diagnostic Chain of the Year Award at National Diagnostic Summit of VOH. Mumbai

Dr. Parimal S. Sarda, Sr Consultant Histopathologist awarded for poster presentation - Decoding PNH data - A flow Cytometry experience at 25th TCS Conference, Lucknow.

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Unipath Specialty Laboratory at The 13th East Zonal Oncology Symposium at Novotel, Kolkata.