PRECIPIO EXPECT MORE
203-787-1717
203-901-1289

COMPREHENSIVE REPORT

Patient: John A. Doe
DOB/Gender: 10/10/44 (74 yrs) - Male
Patient ID/MRN: 123456
Date Collected: 04/12/2019

Case# /Status: X19-00323 - Final

Report Category:
Neoplastic

Provider: John Doe, M.D.
Hematology Oncology Associates
Tel: 800-123-4567
Fax: 800-765-4321

DIAGNOSIS:

Chronic myelomonocytic leukemia (CMML) and monoclonal B-cell lymphocytosis (MBL) (see comment)

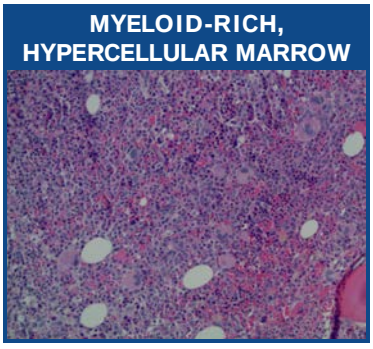
COMMENT

The findings are consistent with involvement by a MYELODYSPLASTIC SYNDROME/MYELOPROLIFERATIVE NEOPLASM. Given the history of an unexplained persistent absolute monocytosis, the morphologic findings are consistent with involvement by CHRONIC MYELOMONOCYTIC LEUKEMIA (CMML). The presence of less than 5% blasts further categorizes this into CMML-0 and a white blood cell count less than 13 x 10^9/L favors the "dysplastic type" according to the 2016 revision to the WHO (Arber DA, Blood 2016). If clinically indicated, molecular analysis for SRSF2, TET2 and ASXL1, which is found in more than 80% of cases, may be performed.

In addition, flow cytometry identified a small kappa monoclonal B cell population which based on the patient's lymphocyte count is consistent with a MONOCLONAL B CELL LYMPHOCYTOSIS (MBL). Correlation with clinical and laboratory findings is advised.

COMPONENT DIAGNOSES

Biopsy:	Myelodysplastic syndrome/myeloproliferative neoplasm (see comment)
Aspirate:	Maturing trilineage hematopoiesis with occasional trilineage dysplasia and a monocytosis
Flow Cytometry:	Monoclonal B-cell lymphocytosis (MBL) (see comment)
Karyotyping:	Normal male karyotype (see interpretation)
FISH:	No Clonal Abnormalities Detected, see interpretation below.



CLINICAL DATA

Monocytosis. Leukocytosis. Splenomegaly.

Received CBC, reported on 3/6/2019: WBC 12.1; RBC 4.28; HGB 11.1; HCT 35.5; MCV 82.9; MCH 26.0; MCHC 31.4; RDW 17.6; PLT 421; MPV 10.3; LYM 23%; MON 24%; NEU 'NP'; EOS 1%; BAS 0% (NP = not provided)

Electronically Signed By: Frank Bauer, MD (04/18/19 17:39)

DIAGNOSIS:

Bone marrow, core & clot biopsies: Myelodysplastic syndrome/myeloproliferative neoplasm (see comment)

COMMENT

The findings are consistent with involvement by a MYELODYSPLASTIC SYNDROME/MYELOPROLIFERATIVE NEOPLASM. Given the history of an unexplained persistent absolute monocytosis, the morphologic findings are consistent with involvement by CHRONIC MYELOMONOCYTIC LEUKEMIA (CMML). The presence of less than 5% blasts further categorizes this into CMML-0 and a white blood cell count less than 13 x 10^9/L favors the "dysplastic type" according to the 2016 revision to the WHO (Arber DA et al, Blood 2016).

MICROSCOPIC DESCRIPTION

Marrow Cellularity: Markedly hypercellular for age (90%)
Megakaryocytes: Moderately increased, occur in occasional clusters and include occasional small, hypolobated and dysplastic forms.
Myeloid Maturation: Normal
Erythroid Maturation: Normal
Myeloid:Erythroid Ratio: Mildly increased
Lymphoid Aggregates: Two lymphoid aggregates composed of small sized cells, comprise less than 5% of the marrow cellularity.
Granulomas: Not seen
Marrow Trabeculae: Normal
Hemosiderin: Present
Iron Stain: Focal stainable iron is present in this decalcified specimen
Marrow Reticulin: Mildly, diffusely increased
Clot Preparation: Similar to the core biopsy
PAS / Giemsa: Evaluated
Special Stains: Giemsa, Iron, PAS, Reticulin
Immunostains: CD34 highlights less than 5% of the marrow cellularity. The lymphoid aggregates are predominantly composed of CD20 positive B cells with a few admixed CD3 positive T cells, all of which are negative for cyclin D1. The purpose for these ancillary tests is to evaluate the percentage of immature myeloid forms and the lymphoid aggregates.

Additional Studies:

Stain	Result
CD3 (MRQ-39)	See microscopic description above
CD20 (L26)	See microscopic description above
Cyclin D1 (SP4)	See microscopic description above
CD34 (QBEnd/10)	See microscopic description above

Electronically Signed By: Frank Bauer, MD (04/18/19 17:37)

GROSS DESCRIPTION:
1. The specimen is received in formalin labeled with the patient's initials and requisition number, and consists of 1 piece of bone marrow core measuring 2.0 x 0.2 x 0.2 cm. The specimen is submitted in 1 cassette after decalcification.
2. The specimen is received in formalin labeled with the patient's initials and requisition number, and consists of 1 piece of marrow clot measuring 2.0 x 1.0 x 0.8 cm. The specimen is submitted in 1 cassette.

DIAGNOSIS:

Bone marrow, aspirate: Maturing trilineage hematopoiesis with occasional trilineage dysplasia and a monocytosis

SMEAR REVIEW

The marrow aspirate smear is spicular and cellular for diagnostic evaluation. Megakaryocytes are moderately increased in number with occasional atypical forms. The myeloid : erythroid (M:E) ratio is approximately 4:1. Erythroid elements exhibit maturation and include occasional dysplastic forms with irregular nuclear contours. Myeloid elements exhibit maturation and include occasional dysplastic forms with decreased granularity. No increase in eosinophilic forms is seen. No increase in immature cells is noted. Iron, but no increase in ring sideroblasts is detected on iron stain of the marrow aspirate.

Number of cells counted: 501

Cell Type	Percent	Ref. Range
Blasts	1 %	0.3 - 3.0 %
Immature myeloid	14 %	12.0 - 21.0 %
Mature myeloid	57 % ↑	35.0 - 55.0 %
Eosinophils	1 %	1.0 - 3.0 %
Basophils	0 %	0.0 - 1.0 %
Lymphocytes	2 % ↓	10.0 - 15.0 %
Plasma cells	0 %	0.0 - 1.0 %
Monocytes	6 % ↑	0.0 - 1.0 %
Erythroid	18 %	15.0 - 25.0 %
M:E ratio	4:1	2 - 4:1

Electronically Signed By: Frank Bauer, MD (04/13/19 17:37)

DIAGNOSIS:

Bone marrow, aspirate: Monoclonal B-cell lymphocytosis (MBL) (see comment)

COMMENT

In the setting of an absolute lymphocyte count of 2.8 x 10^9/L, the presence of a CD5 positive, clonal population of B cells is consistent with a Monoclonal B-Cell Lymphocytosis (MBL). According to the 2016 WHO classification this falls into a "high count" MBL (between 0.5 and 5.0 x 10^9/L), for which routine annual follow-up is advised (Swerdlow SH et al., Blood 2016). In addition, less than 5% CD34 positive blasts are identified, supporting the blast count by aspirate smear.

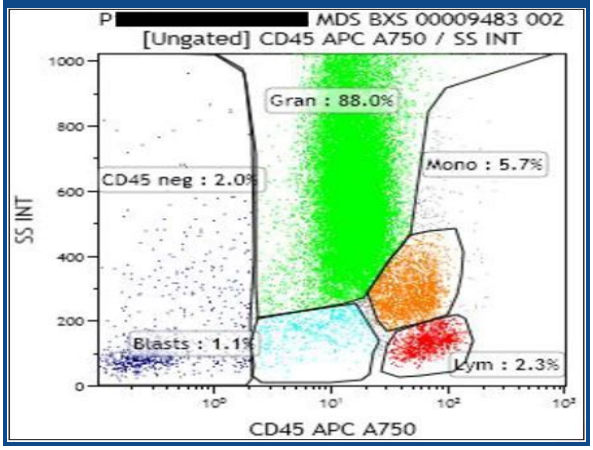
INTERPRETATION

The differential shows increased granulocytes (88%). There is a total of 2% CD34 positive cells identified. The lymphocytes (2%) include 29% kappa-restricted B-cells, 60% mature T-cells with a normal CD4/CD8 ratio, and 13% natural killer (NK) cells. The CD138 positive plasma cells (<1%) have a polyclonal kappa/lambda phenotype.
The B-cells show a loss of surface light chain expression and are partially positive for CD5, FMC7, and CD23, but negative for CD10 and CD103.

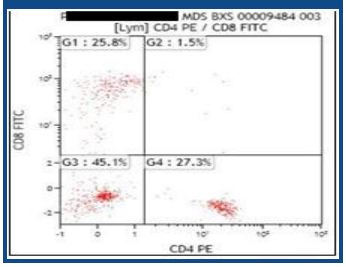
RESULT

Analysis Time: 4/12/19 13:04 Viability: 98% (Normal > 80%) Specimen: BM, Lavender-top tube

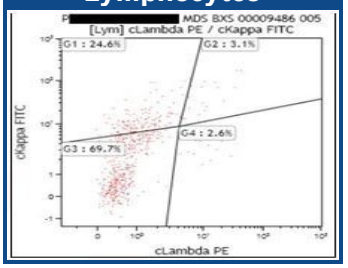
Flow Differential



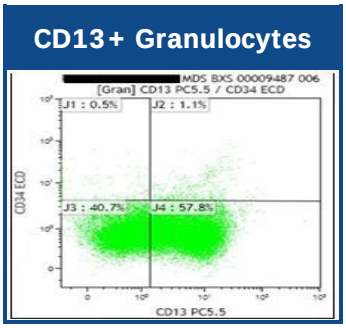
Normal CD4/CD8 Ratio



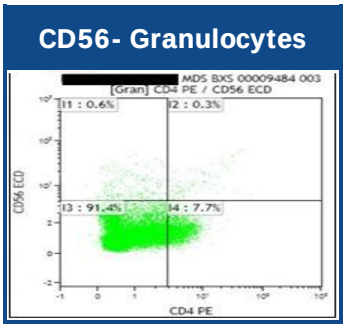
Kappa Restricted B-Lymphocytes



CD13+ Granulocytes



CD56- Granulocytes



Flow Cytometry Differential

Lymphocytes:	2%
Monocytes:	6%
Granulocytes:	88%
Plasma Cells:	<1%
Blasts:	1%
nRBC & Debris:	2%

Granulocytes

Marker	%
CD4	8
CD10	28
CD11b	83
CD13	59
CD14	17
CD15	5
CD16	48
CD19	2
CD33	98
CD34	2
CD45	100
CD56	1
CD61	21
CD64	61
CD71	1
CD117	9
HLA-DR	5

Lymphocytes & Plasma

Marker	%
CD2	73
CD4	27
CD5	60
CD7	73
CD8	26
CD10	<1
CD11c	4
CD19	28
CD20	28
CD23	7
CD25	14
CD38	11
CD45	100
CD56	13
CD79b	17
CD103	1
FMC-7	13
Kappa	25
Lambda	3
sKappa	8
sLambda	5
ZAP-70	1

Electronically Signed By: Frank Bauer, MD (04/13/19 17:38)

Disclaimer: The adequacy of staining is verified by the appropriate positive and negative controls. The reagents used for these assays are analyte specific reagents (ASR). Their performance characteristics have been validated by Precipio, Inc., New Haven, CT. They have not been reviewed by the FDA. The FDA has deemed that such approval is unwarranted. These assays are for clinical use and should not be viewed as experimental or "research use only".

DIAGNOSIS:

Bone marrow, aspirate: Normal male karyotype (see interpretation)

INTERPRETATION

KARYOTYPE "ISCN": 46,XY[20]; Normal Male Karyotype

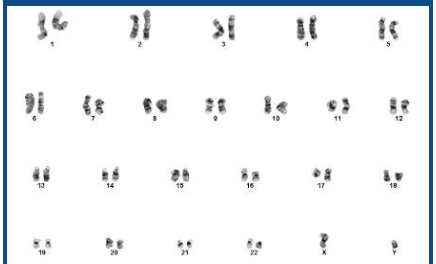
Conventional cytogenetic analysis shows a male karyotype with no evidence of an acquired clonal abnormality.
This does not exclude the possibility of an abnormality that cannot be detected at the chromosomal level or exists at a low residual level.

Interpretation of this specimen's cytogenetic results should be made in conjunction with morphologic, immunophenotypic, and clinical findings. The results of this analysis do not exclude the possibility of genetic alterations below the band-resolution of this test or abnormalities due to other etiologies.

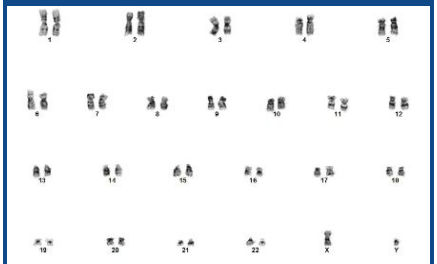
Analysis

Cells Counted:	**20**
Cells Analyzed:	**20**
Cells Imaged:	**3**
Cells Karyotyped:	**3**
Band Level:	**450**
Banding Type:	**G-Banding**
Indication:	**Monocytosis, Leukocytosis & Splenomegaly**

Normal Karyotype



Normal Karyotype



Electronically Signed By: Frank Bauer, MD (04/18/19 16:38)

DIAGNOSIS:

Bone marrow, aspirate: No Clonal Abnormalities Detected, see interpretation below.

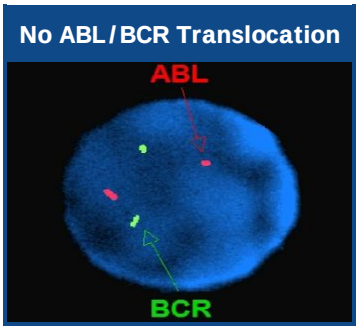
INTERPRETATION

FISH "ISCN": nuc ish (ABL,BCR)x2[200]

Fluorescence in situ hybridization (FISH) with a panel of probes specific for detection of recurring chromosome abnormalities in CML was performed on uncultured bone marrow cells.

The regions/loci represented in these probe mixes were:

BCR/ABL, dual color, dual fusion translocation probes, specific for detection of BCR /ABL fusion [t(9;22)], reveal a hybridization pattern within normal limits in 200 analyzed nuclei.



Electronically Signed By: Frank Bauer, MD (04/18/19 14:38)

Disclaimer: The adequacy of staining is verified by the appropriate LSI controls. The reagents used for these assays are analyte specific reagents (ASR). Their performance characteristics have been validated by Precipio, Inc., New Haven, CT. They have not been reviewed by the FDA. The FDA has deemed that such approval is unwarranted. These assays are for clinical use and should not be viewed as experimental or "research use only".

Patient: John A. Doe

:eived: 04/12/11 13:30

Case #: X19-00323

Reported: 04/18/19 17:54

Received Information: 2 Formalin containers, 9 smears, 1 touch prep, 2 green-top tubes, 1 lavender-top tube