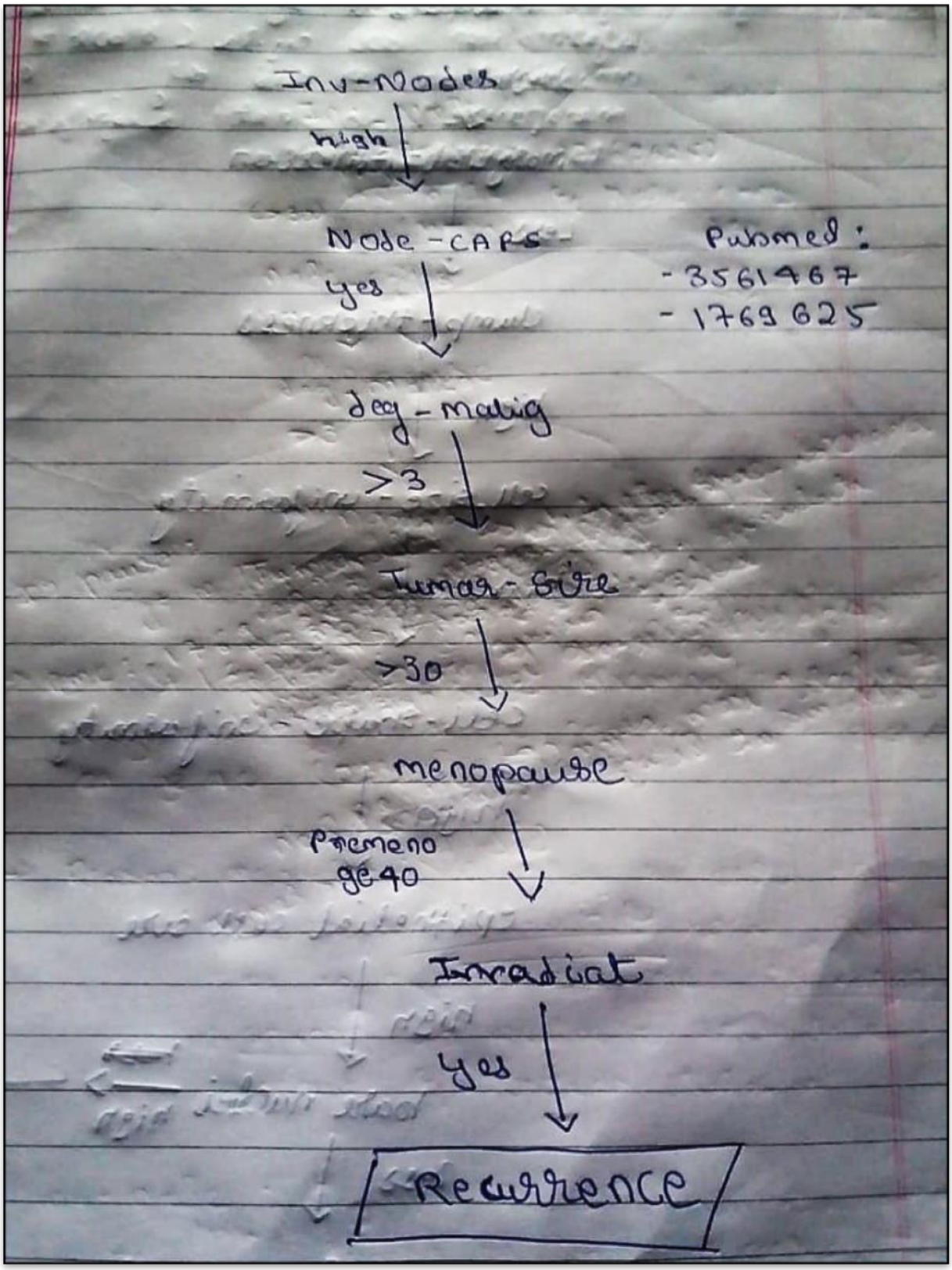
Pathway (Dataset 1)

- ***Based on Literature analysis***



Description on pathway:

Inv-node : Lymph node : This are small
&
Node - CAPS clumps of immune cell's.
lymph node (neg) - lymph node
neg do not contain cancer in
lymphatic system.
With lymph node (pos) means
cancer cell in lymphatic sys.

deg-malig : Tumor are graded as 1, 2, 3, 4
depending on abnormality.
1 & 2 → normal
3 & 4 → undifferiantied

PMC : 1769625

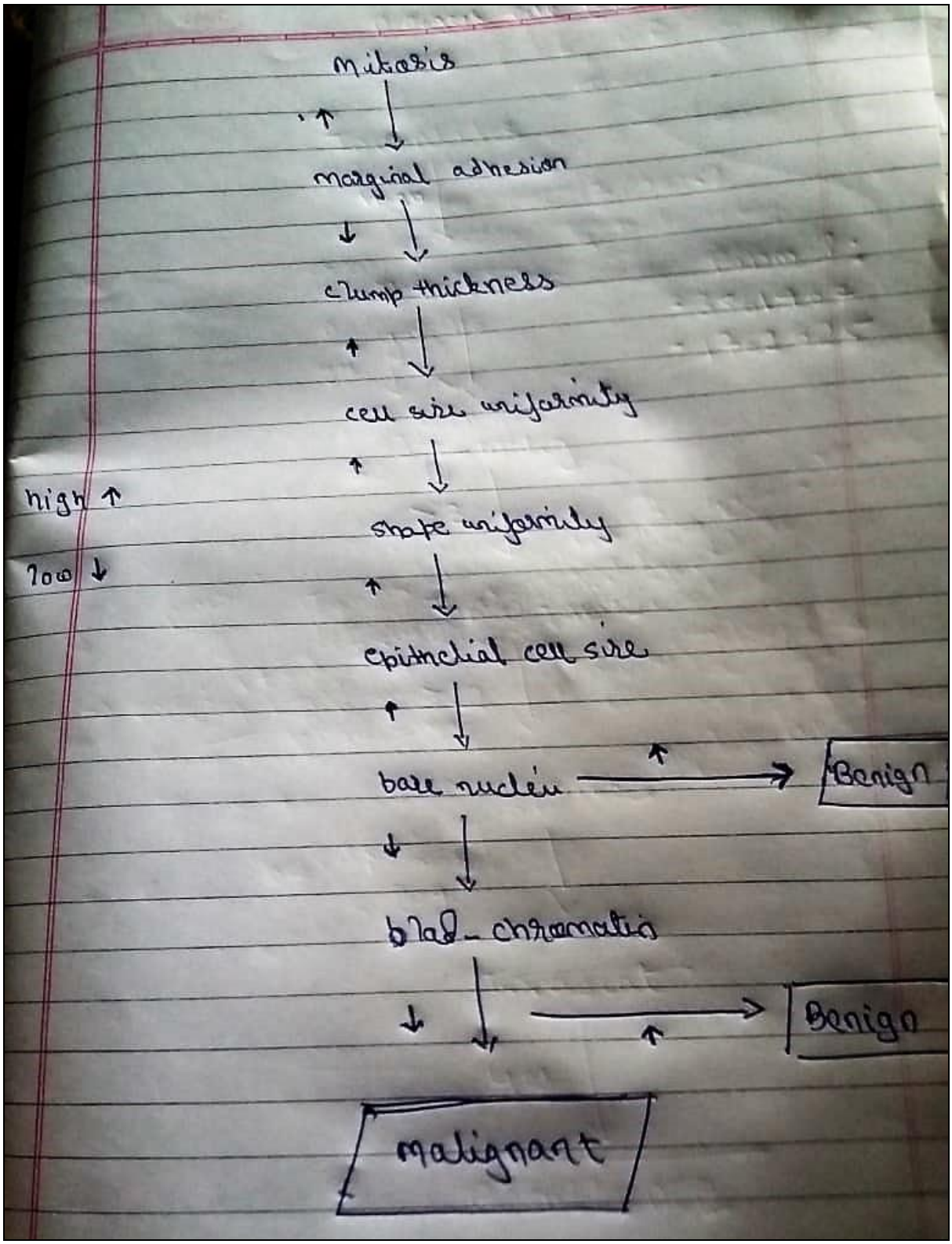
Menopause : Breast ca risk for (Premeno / ge 40)
have high risks of breast ca compared
to postmeno / Lt 40
PMC : 3561467

Reason : Menopause at later or older age increases
the risks of cancer, probably she is
exposed to more estrogen.
Estrogen is needed to stimulate
breast & ovarian tissue

Tumor Size : nodule > 30 mm is more likely to
be cancerous compared to smaller
nodule

Age : Age Independent of menstruation inflammation or cycle (start of menstruation or end of menopause) is not significant to cancer risk

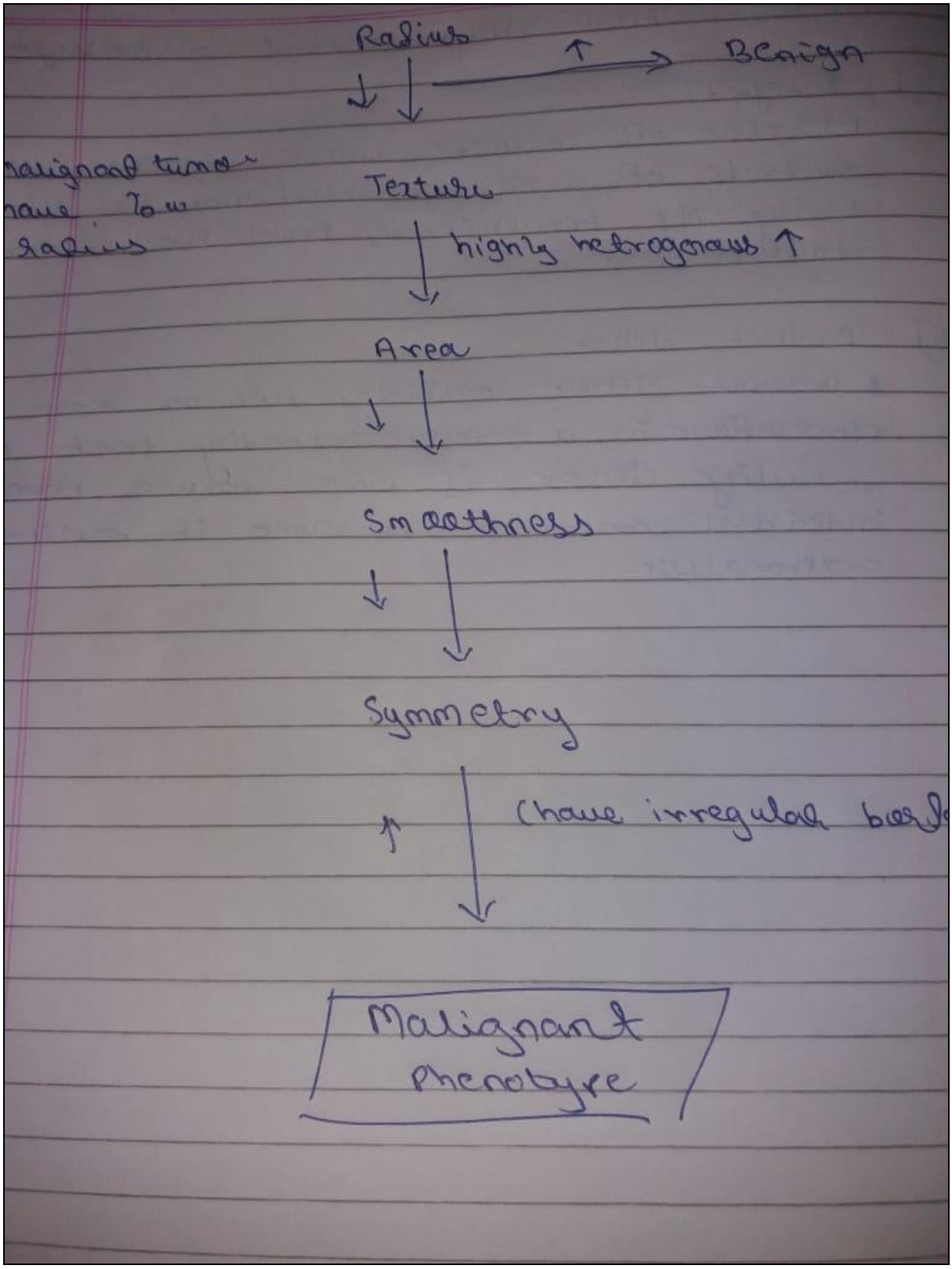
Pathway (Dataset 2)



Description on pathway:

1. **clump_thickness**: (1-10). Benign cells tend to be grouped in monolayers, while cancerous cells are often grouped in multilayers.
2. **cell_size_uniformity**: (1-10). Cancer cells tend to vary in size and shape. That is why these parameters are valuable in determining whether the cells are cancerous or not.
3. **cell_shape_uniformity**: (1-10). Uniformity of cell size/shape: Cancer cells tend to vary in size and shape. That is why these parameters are valuable in determining whether the cells are cancerous or not.
4. **marginal_adhesion**: (1-10). Normal cells tend to stick together. Cancer cells tends to loose this ability. So loss of adhesion is a sign of malignancy.
5. **single_epithelial_cell_size**: (1-10). It is related to the uniformity mentioned above. Epithelial cells that are significantly enlarged may be a malignant cell.
6. **bare_nuclei**: (1-10). This is a term used for nuclei that is not surrounded by cytoplasm (the rest of the cell). Those are typically seen in benign tumours.
7. **bland_chromatin**: (1-10). Describes a uniform "texture" of the nucleus seen in benign cells. In cancer cells the chromatin tend to be more coarse.
8. **normal_nucleoli**: (1-10). Nucleoli are small structures seen in the nucleus. In normal cells the nucleolus is usually very small if visible at all. In cancer cells the nucleoli become more prominent, and sometimes there are more of them.
9. **mitoses**: (1-10). Cancer is essentially a disease of uncontrolled mitosis.

Dataset3:


Radius
↓
↓
↑
Benign
Texture
↓
highly heterogenous ↑
Area
↓
↓
Smoothness
↓
↓
Symmetry
↑
↓
Malignant
Phenotype

Reference:

1. https://www.cancer.net/navigating-cancer-care/prevention-and-healthy-living/menopause-and-cancer-risk
2. PMC – 3561467
3. https://www.neuraldesigner.com/learning/examples/breast_cancer_diagnosis
4. https://ww5.komen.org/BreastCancer/LymphNodeStatus.html
5. https://www.cancer.gov/news-events/cancer-currents-blog/2017/breast-cancer-lymph-node-removal
6. https://www.cancer.gov/about-cancer/diagnosis-staging/prognosis/tumor-grade-fact-sheet
7. http://www.cancer.ca/en/cancer-information/cancer-type/breast/grading/?region=on
8. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1769625/
9. https://www.mayoclinic.org/diseases-conditions/lung-cancer/expert-answers/lung-nodules/faq-20058445
10. https://www.cancercenter.com/breast-cancer/risk-factors/
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12. https://www.nature.com/articles/s41523-017-0045-3/tables/1
13. https://www.nature.com/articles/s41523-017-0045-3/tables/2
14. PMC5139106
15. PMC3457875
16. PMC3457871
17. PMC2894028