

***non-gynecological cytology on
liquid-based preparations***

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non-gynecologic cytology on liquid-based preparations

cancer is #1 cause of death in hong kong
>12,000 deaths

whistler's mother

non-gyn liquid-based cytology

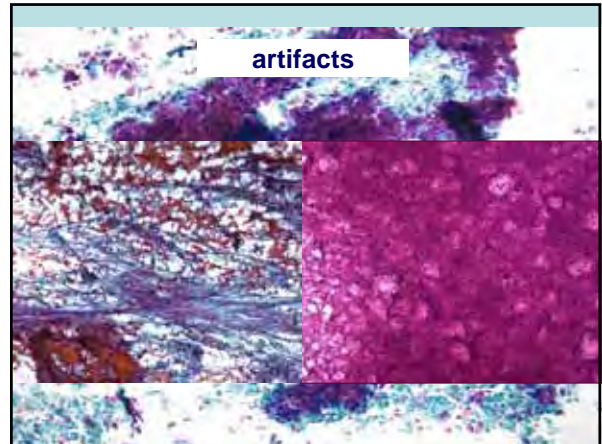
- liquid-based preparation
- advantages
- general artifacts

conventional preparation

- direct smear
- cytospin

direct smears

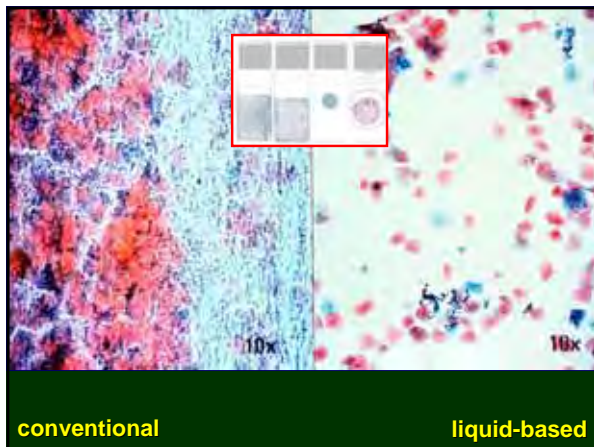
<p>advantages</p> <ul style="list-style-type: none"> ▪ fast ▪ inexpensive ▪ retains background ▪ routine processing 	<p>disadvantages</p> <ul style="list-style-type: none"> ▪ handling of needle ▪ multiple slides ▪ obscuring background ▪ air drying
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adequacy, presence of abnormal cells, number and distribution of abnormal cells, relationship between cells, cell size, shape, nuclear size, shape, n:c ratio, nuclear changes, nucleoli, cytoplasmic features, background or diathesis, abnormality in size and shape of cells, variation in cell size and shape, increase in nuclear size, nuclear membrane irregularity, hyperchromasia, prominence of nucleoli, irregularity in shape thereof, thickening of nuclear membrane, increase in n:c ratio, cytoplasm, mitosis, increased number and abnormal forms thereof, non-cohesiveness etc

liquid-based preparations

- ThinPrep®, TP
cytc, boxborough, ma
fda-approved for hpv-dna test
- SurePath®, SP
triPath, burlington, nc



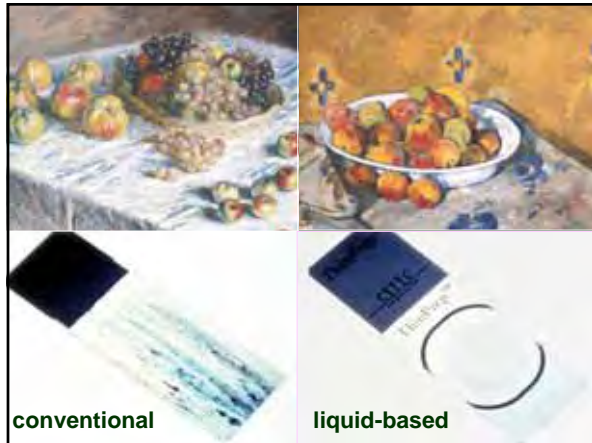
	conventional smear	liquid-based preps
▪ cellularity	high	lower
▪ architecture	preserved	< preserved
▪ cell size	preserved	smaller
▪ background	distracting	cleaner
▪ diathesis	diffuse	clinging, clumped
▪ nuclei	preserved	preserved
▪ ancillary tests	+/-	+

advantages of liquid-based preps

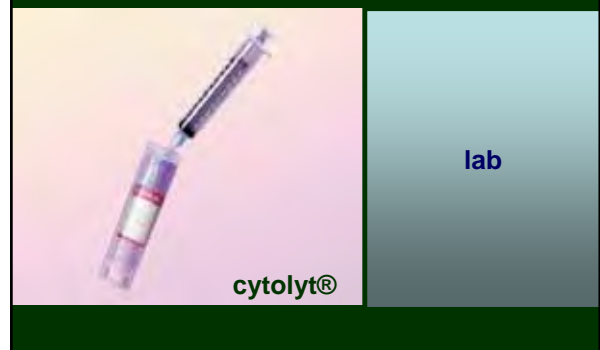
- easier collection & transport
- standardized prep
- 1 slide
- ↓ screening area
- ↓ air-drying artifact
- ↓ obscuring elements
- morphology=conventional prep

problems of liquid-based preps

- background material: ↓ & altered
necrosis, blood, inflammation
- extracellular elements: ↓ & altered
colloid, mucin, stroma
- architectural integrity: disrupted
fragmentation of papillae
- cellular morphology: altered
shrunken



ThinPrep sample collection



ThinPrep processing

- fluid, including urine, specimens
centrifuge sample, add CytoLyt
- mucoid specimens
add 30ml of CytoLyt
- superficial specimens
brushings collected directly in PreservCyt

ThinPrep 2000 processor



ThinPrep process

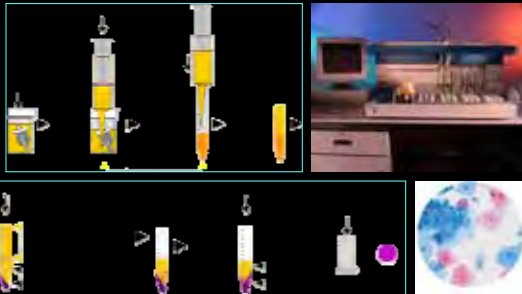


dispersion

SurePath specimen collection



SurePath density gradient: cell enrichment



20 mm
methanol

13 mm
ethanol

technical differences

ThinPrep

- ↑ expensive
- ↓ lab space
- ↓ technical expertise
- prep time: 30 min
- pre-made slides
- screen time: 2 min

SurePath

- ↓ expensive
- ↑ lab space
- ↑ technical expertise
- prep time: 60 min
- slides prepared daily
- screen time: >2 min

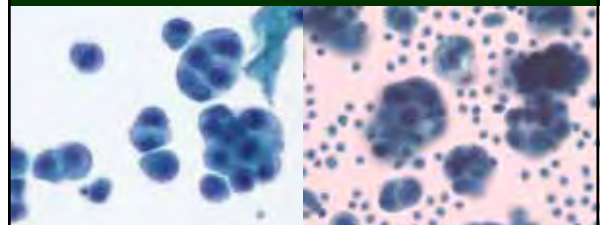
morphologic differences

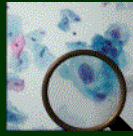
ThinPrep

monolayer
flattened clusters

SurePath

different planes of focus
3-dimensional clusters





cytologists should learn differences
in cytological appearances between
conventional and liquid-based preps

pattern recognition
is key to interpretation



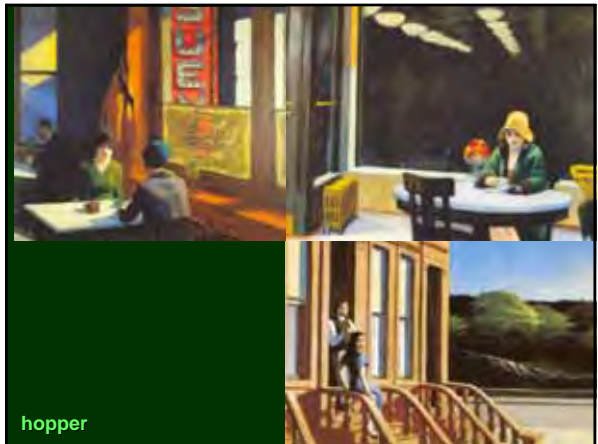
hopper



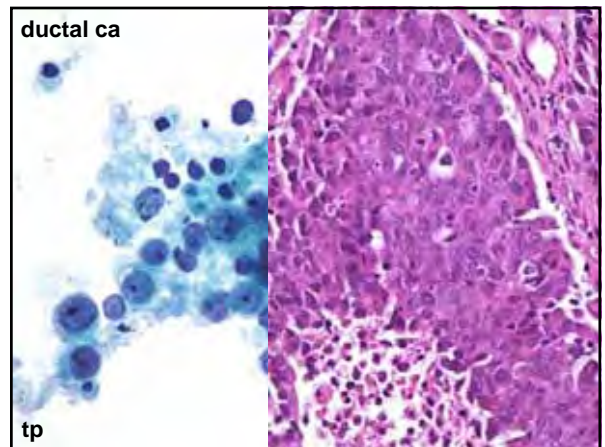
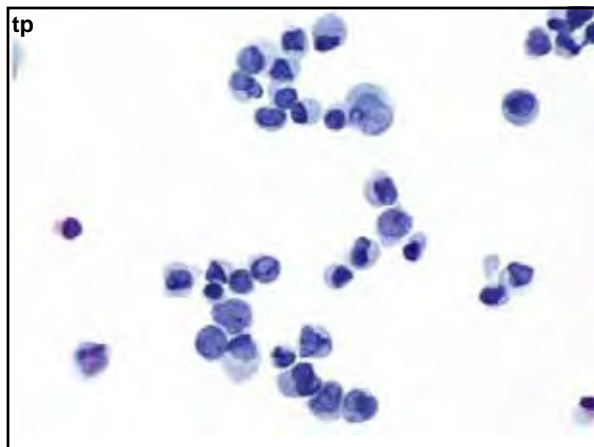
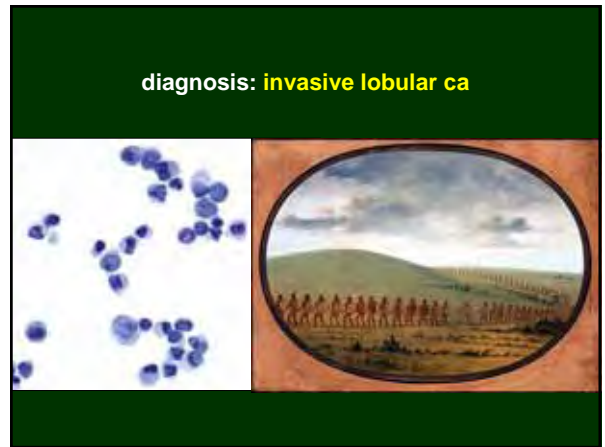
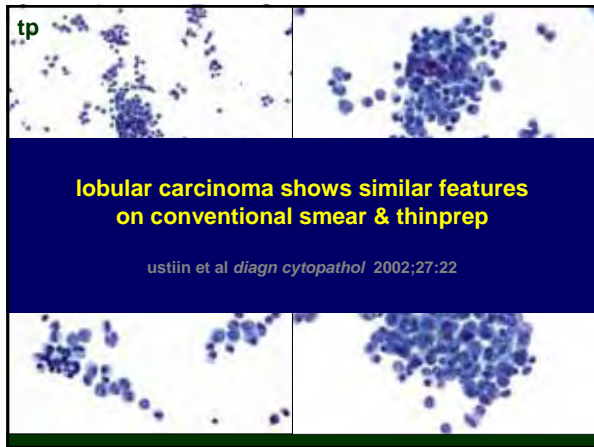
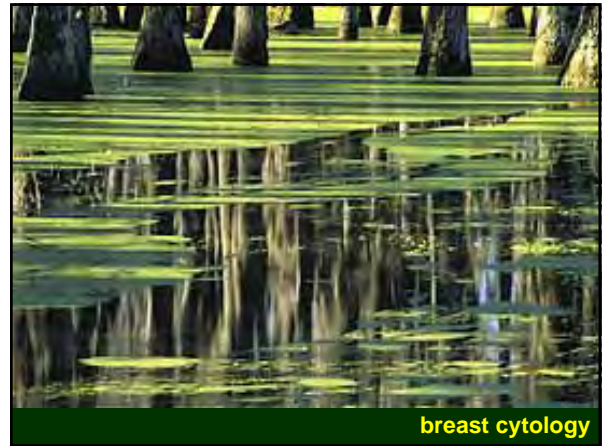
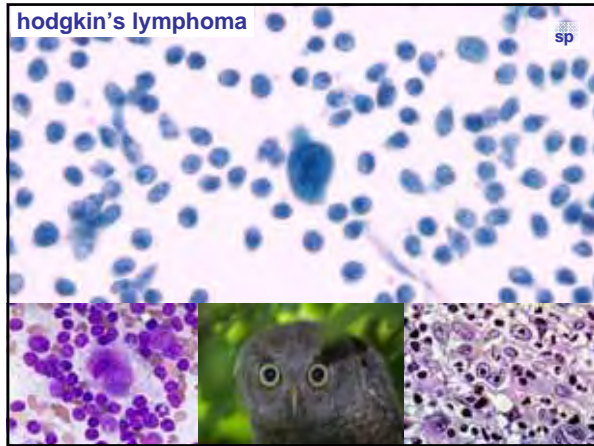
hopper

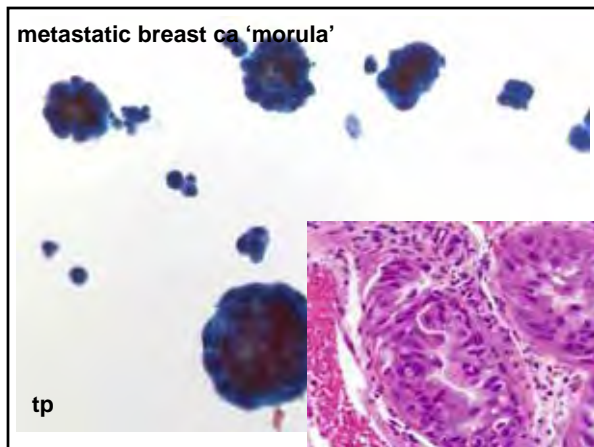
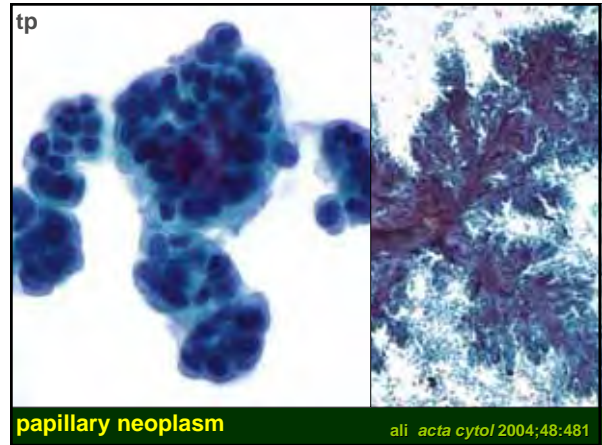
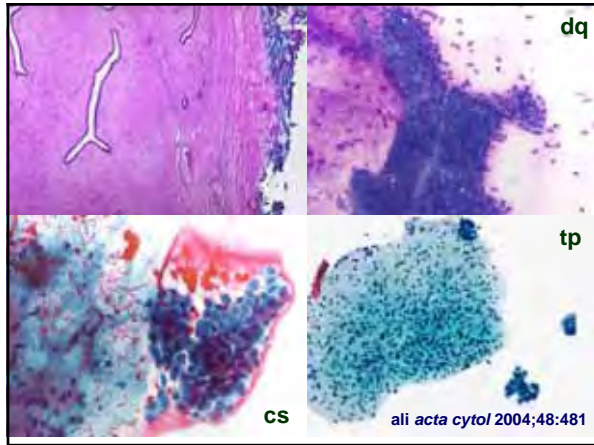
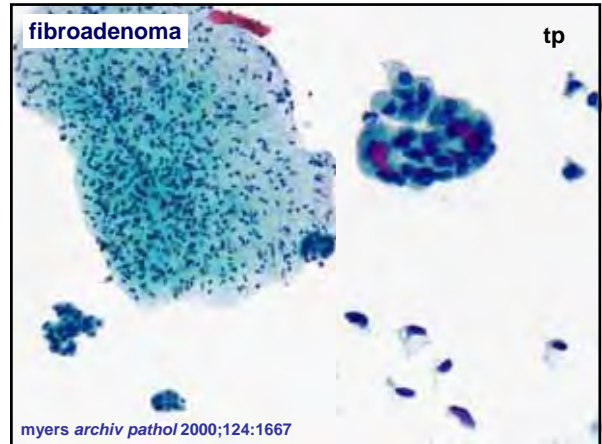
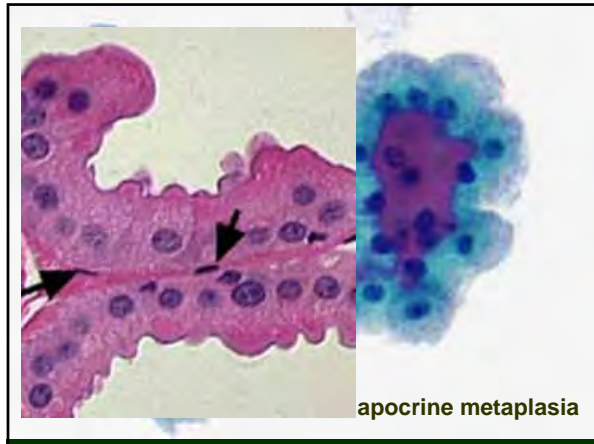


hopper



hopper





cytological diagnosis of breast diseases

	CS	vs	LBP
sensitivity	84	vs	86%
ppv	96	vs	95%
specificity	98	vs	96%
npv	91	vs	88%

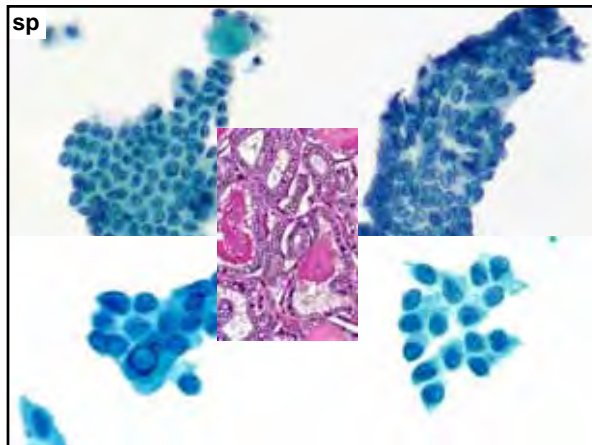
bedard *ajcp* 1999;111:523

breast cytology
problems

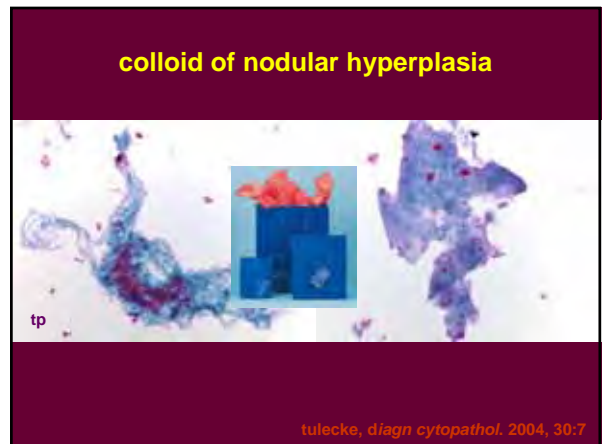
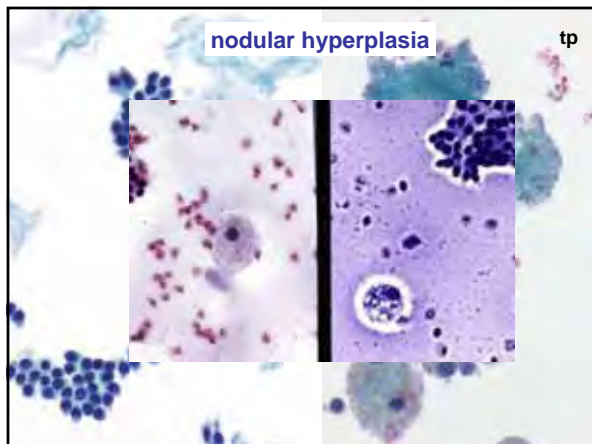
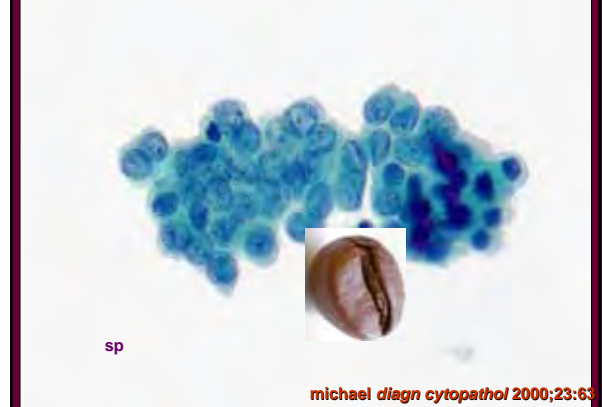
- **fibroadenoma**
 - fewer myoepithelial cells
 - less epithelial stromal relationship
- **colloid carcinoma**
 - scanty mucin
- **papillary neoplasm**
 - fragmentation of papillae

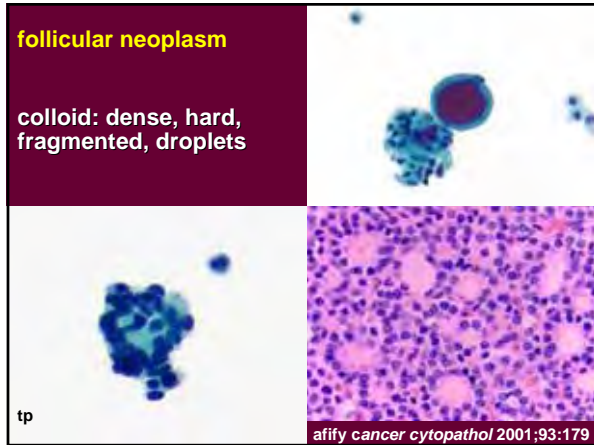
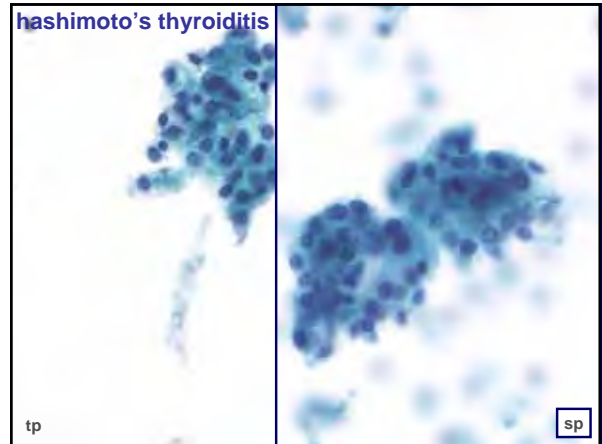
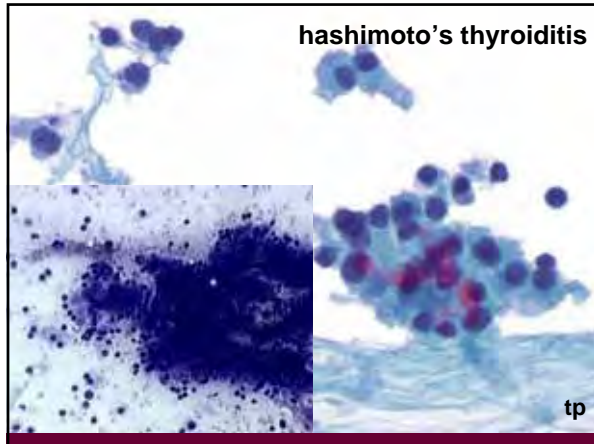


thyroid cytology



diagnosis of papillary carcinoma: nuclear features





thyroid on liquid-based cytology

- sensitivity 97%
- specificity 93%
- + predictive value 93%

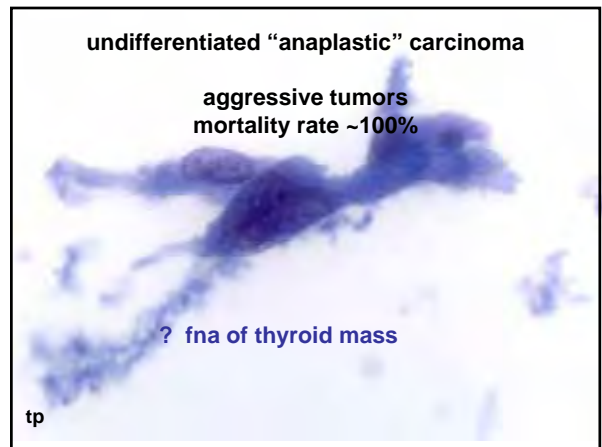
▪ lbp: ? technique of choice for thyroid

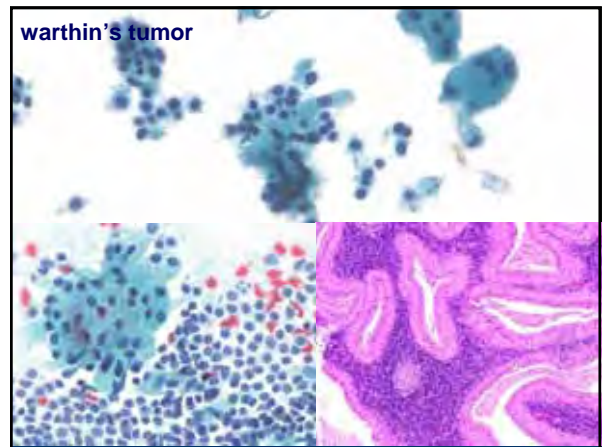
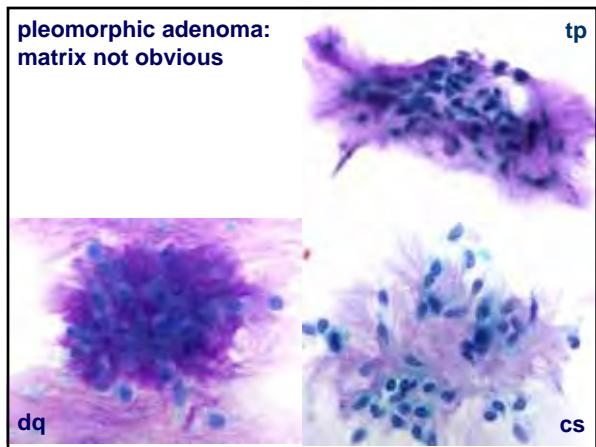
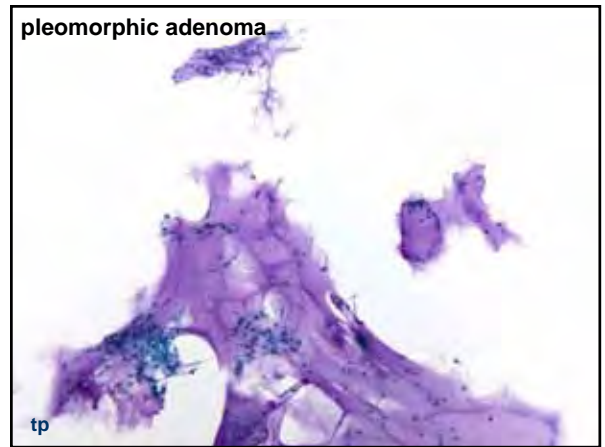
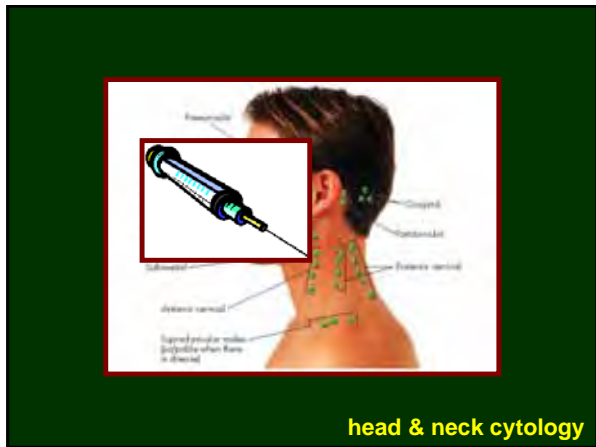
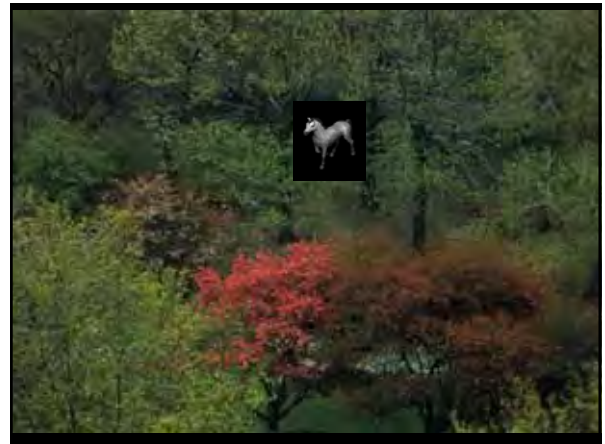
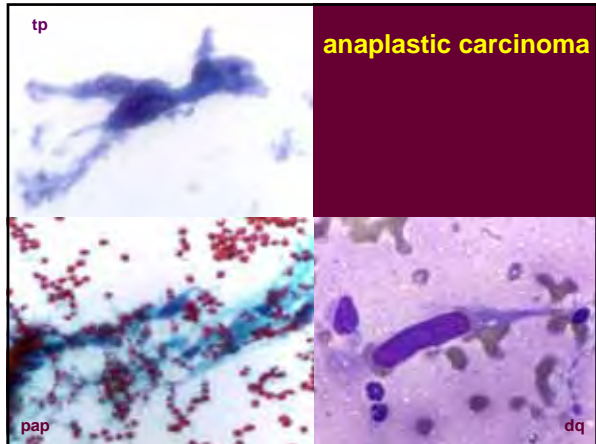
malle acta cytol 2006;50:23
ford otolaryngol head neck surg 2002, 126:554

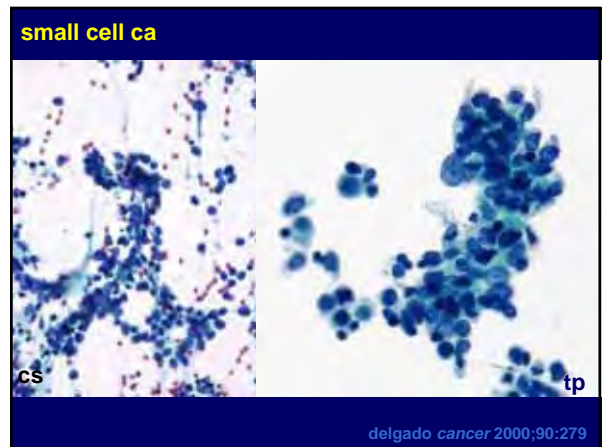
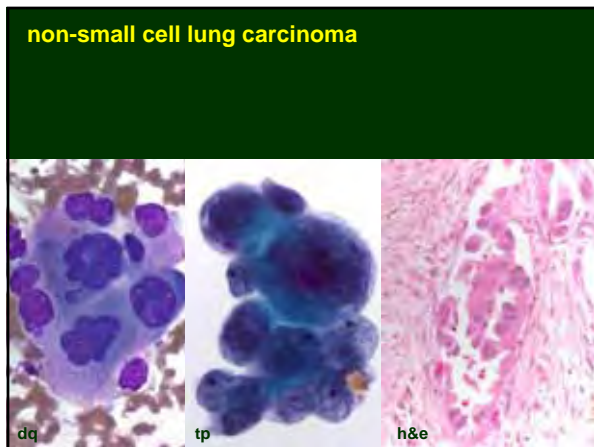
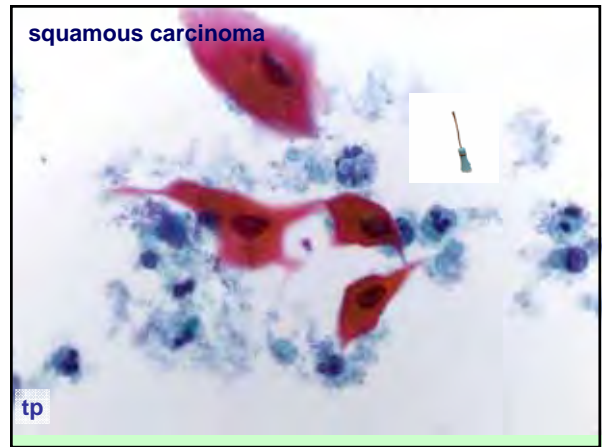
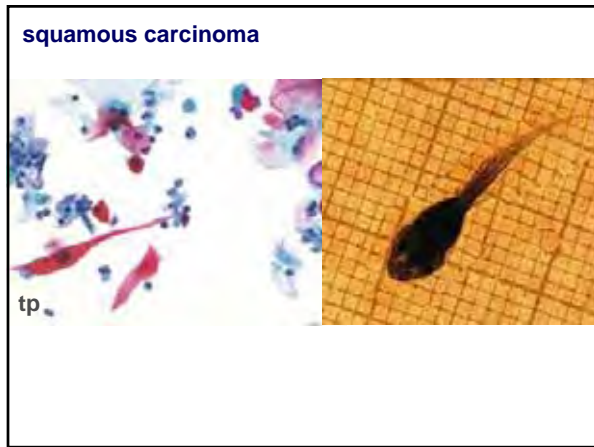
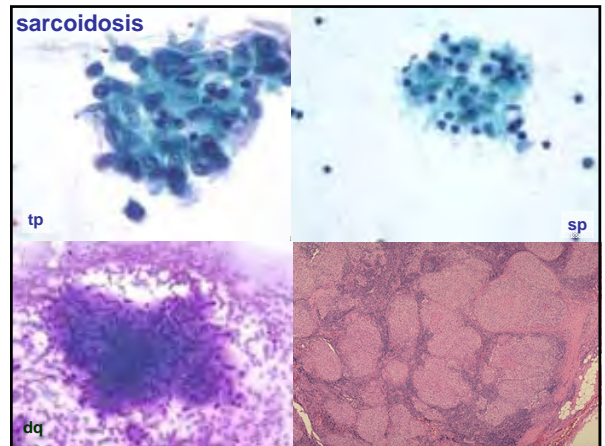
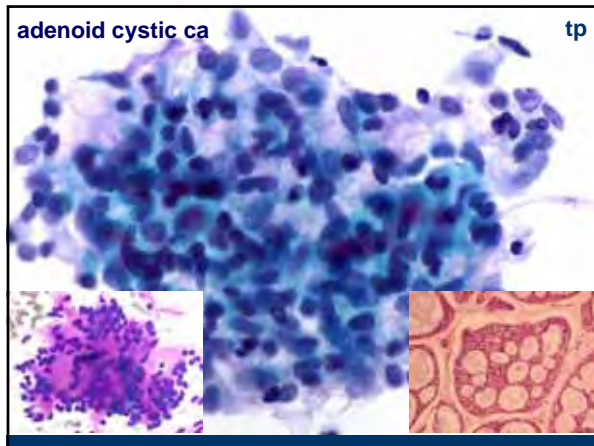
thyroid on liquid-based preparations
problems

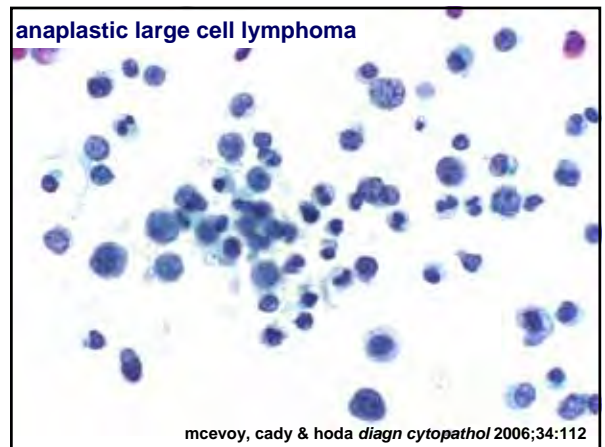
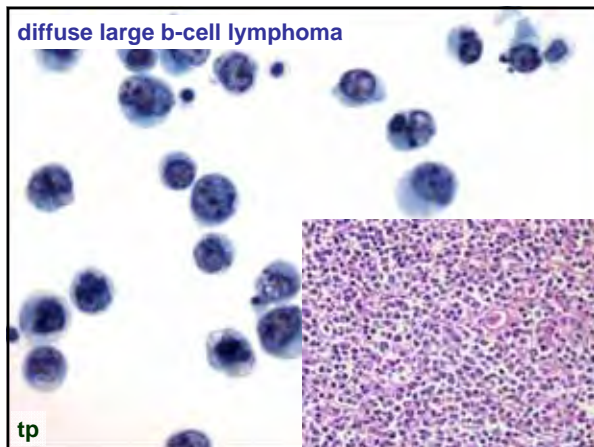
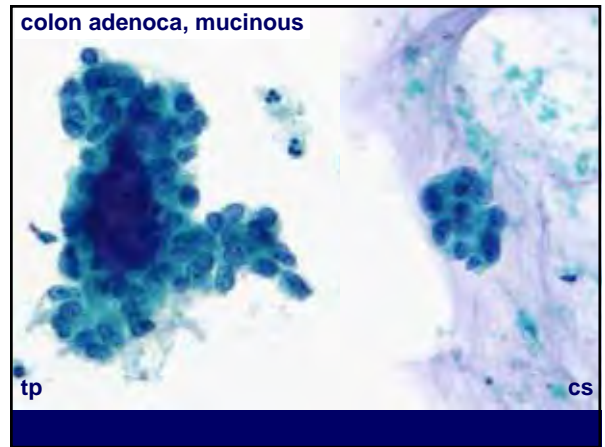
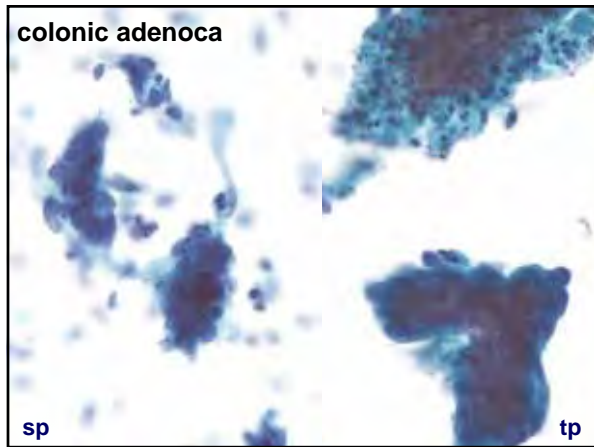
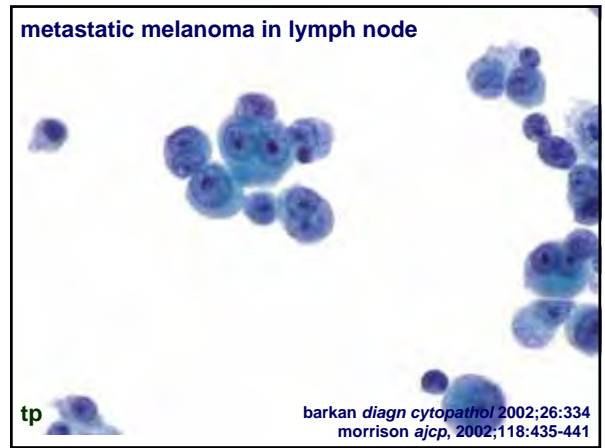
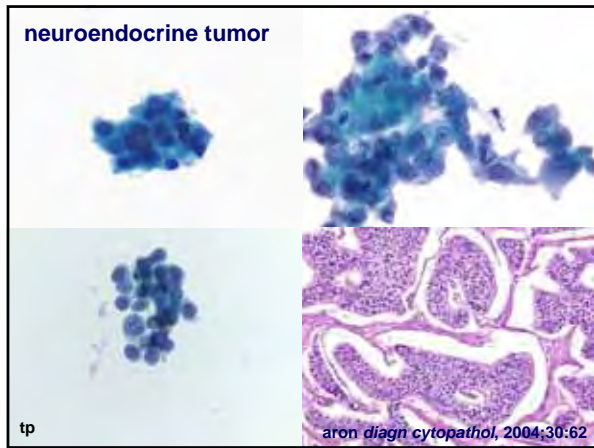
- colloid: changes features
- papillary ca: fragmented
- hashimoto's thyroiditis: low sensitivity

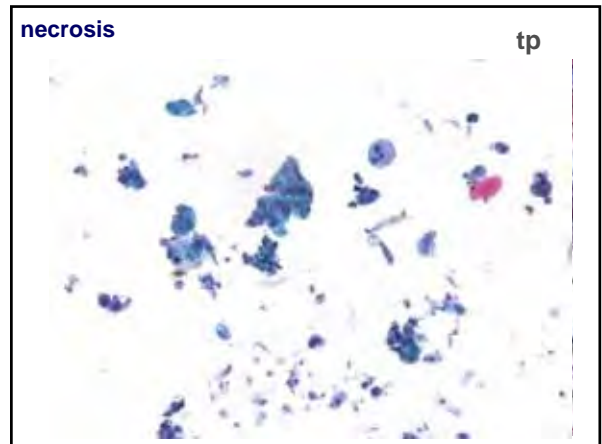
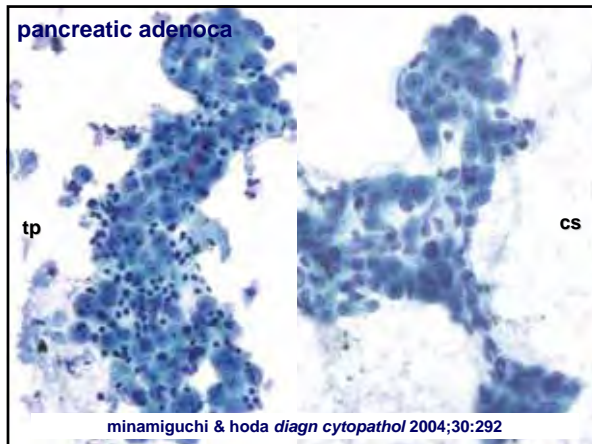
tulecke diagn cytopathol 2004, 30:7-13











pancreatic ca
better preserved on liquid-based preps

- sensitivity tp:cs 091%:058%
- specificity tp:cs 100%:100%

“lbp new frontier in the cytologic assessment of pancreatic lesions”

siddiqui et al *diagn cytopathol* 2005;32:75

metastatic

mnf116

tp

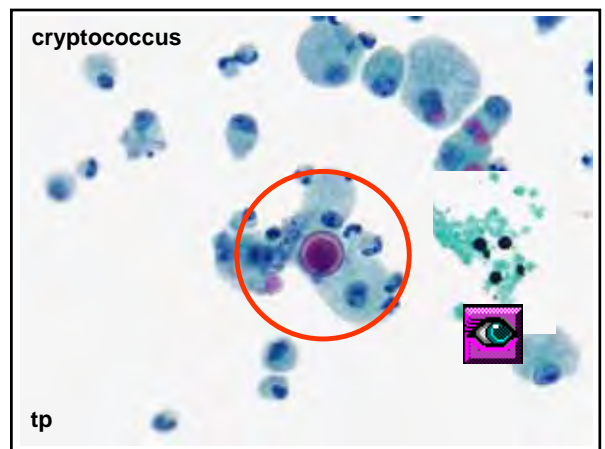
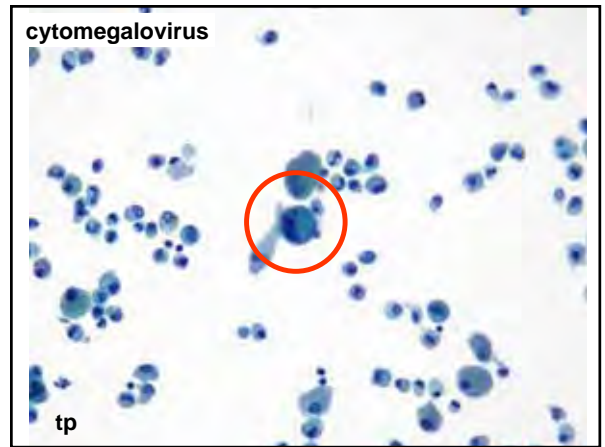
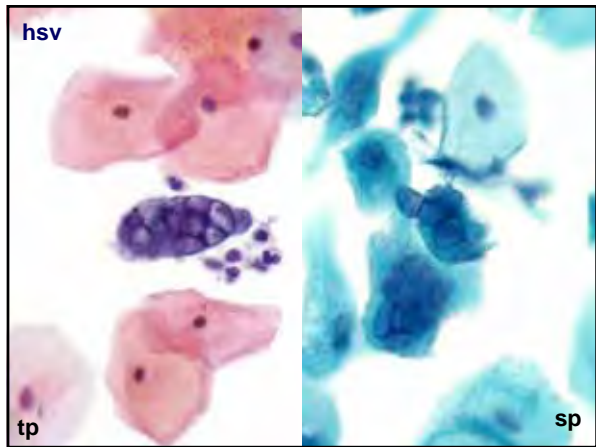
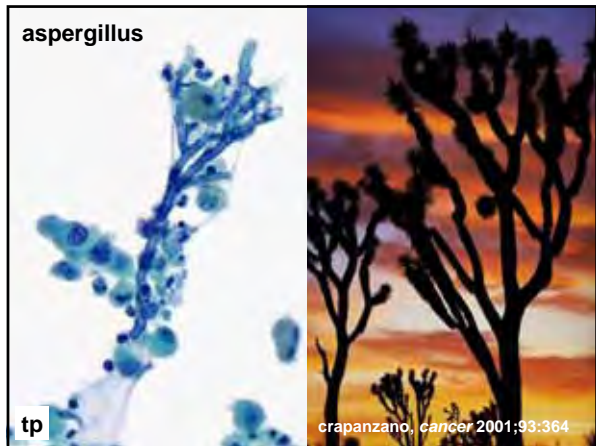
giri & hoda *acta cytol* 2000;44:232

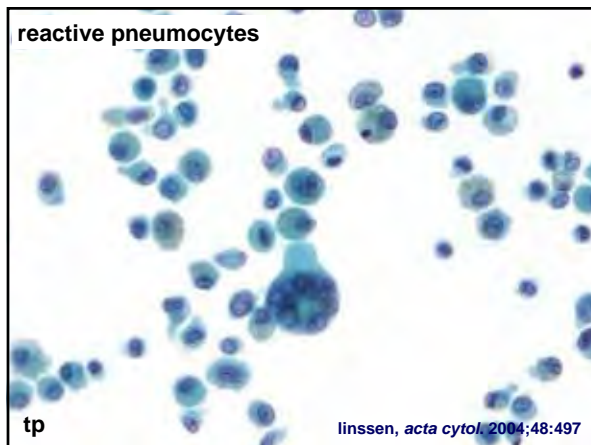
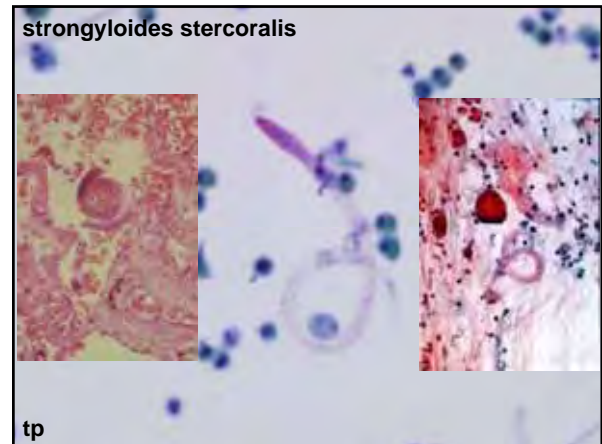
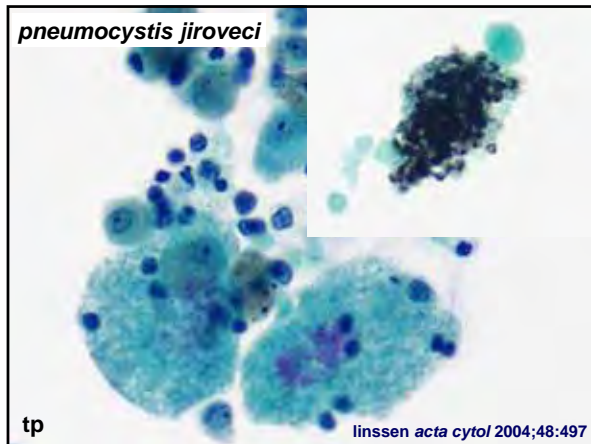


granular cell tumor of bile duct

tp

hoda *acta cytol* 2005;49:199

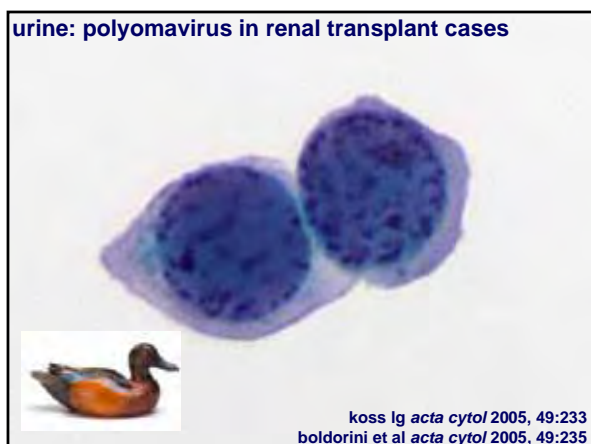




bronchial washing on liquid-based preps

- diagnostic accuracy
1 liquid-based ~ 2-4 conventional
- superior overall quality
- excess mucus may be a problem

koivurinne *acta cytol* 2003;47:637
motherby *acta cytol* 1999;43:47

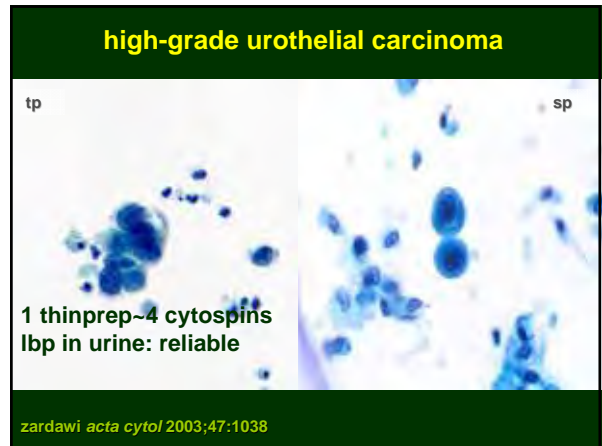
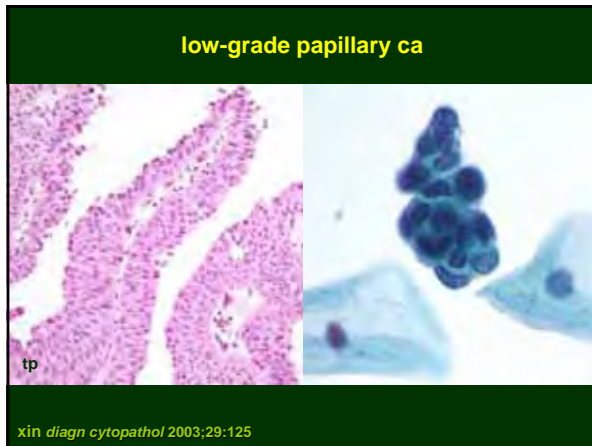


low-grade papillary ca

3 key cytospin criteria applicable to thinprep

- high nuclear:cytoplasmic ratio
- irregular nuclear borders
- homogeneous cytoplasm

xin et al *diagn cytopathol* 2003;29:125



diagnostic sensitivity of urine cytology on...

- ...conventional cytology**
 - low-grade <40%
 - high-grade 79%

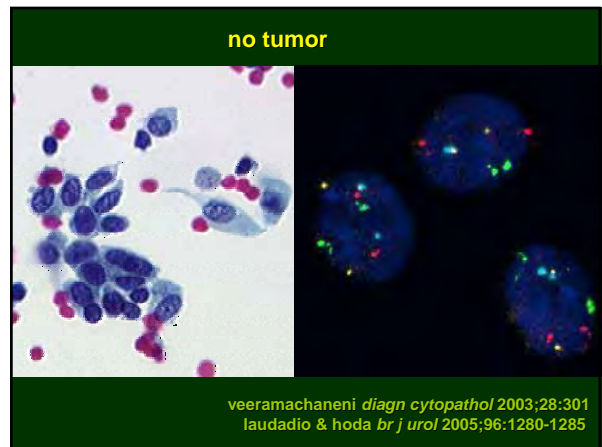
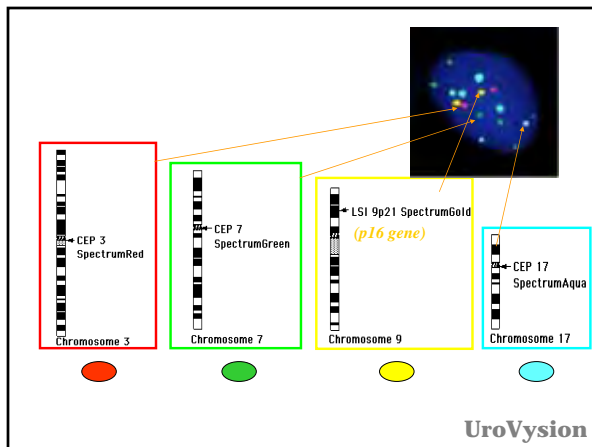
layfield et al diagn cytopathol 2000;30:24
- ...urovysion fish**
 - low-grade 65%
 - high-grade 100%

havling et al j urol 2000;164:1768
- ...thinprep & uv-fish**
 - combined sensitivity of 83.3%
 - combined specificity was 100% & 85.7% resp

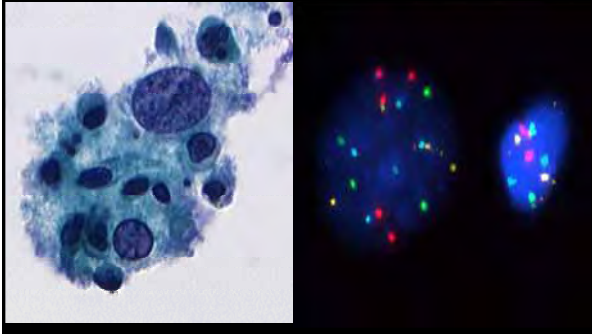
musc experience

fluorescent in situ hybridization for bladder ca detection is more accurate

*papanicolaou society of cytopathology practice guidelines task force
diagn cytopathol 2003;30:24*

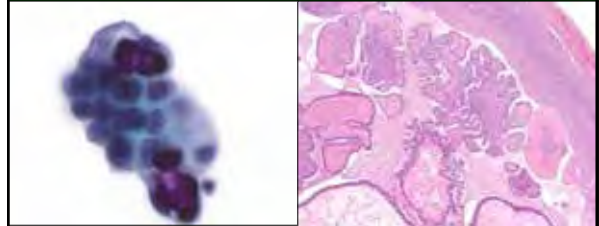


aneuploid high-grade urothelial ca



effusion cytology on lbp

liquid based prep can safely replace conventional preps for effusion cytology



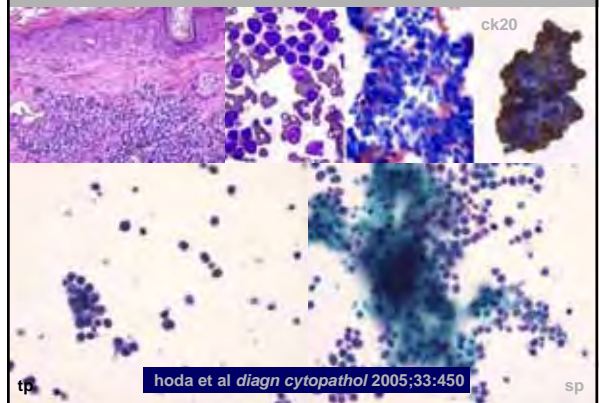
gutman et al *diagn cytopathol* 2005;32:181
gabriel et al *acta cytol* 2004;48:825

immunocytochemistry on liquid-based preps vs conventional smears

- shows = or > intensity on lbp
- distribution of proper staining on lbp
- cleaner background & easier to interpret

dabbs et al. *diagn cytopathol* 1997;17:388

metastatic merkel cell ca



hoda et al *diagn cytopathol* 2005;33:450

liquid-based cytology advantages in cytomorphology

- high diagnostic accuracy
- lesser unsatisfactory rate
- preserved cell features
- lesser fixation artifact
- cleaner background

based on review of literature to date

