

# Diagnosis of diseases of the upper respiratory tract

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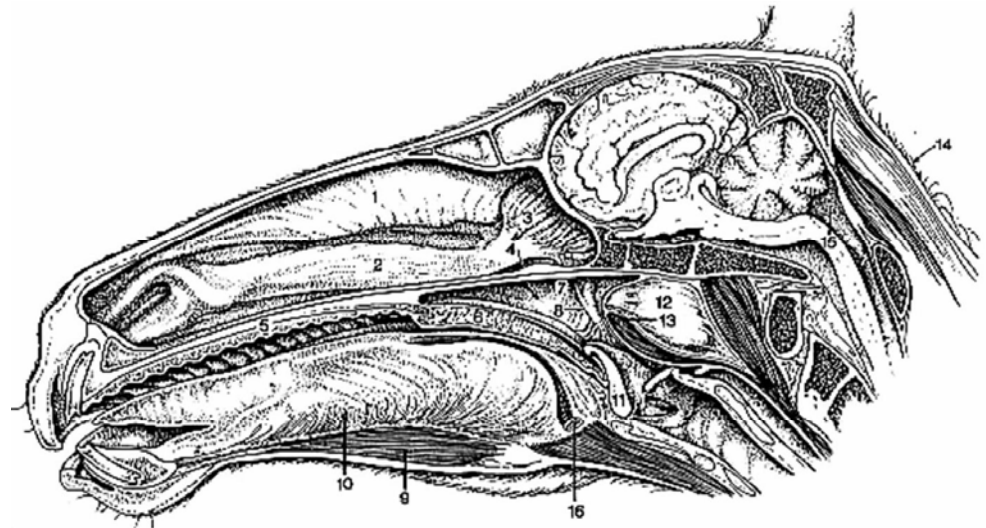


# Normal Anatomy & Physiology

- Upper airway has numerous functions:
  - Conduit for airflow to & from lung
  - Filtering & conditioning inspired air
  - Protection of lower airway vs. aspiration
  - Olfaction
  - Phonation
  - Deglutton
  - Thermoregulation
- The horse is an **OBLIGATE NASAL BREATHER**
- *Therefore a normal upper airway is critical*

# Normal anatomy & physiology

- External nares
- Nasal turbinates
- Nasopharynx
- Soft palate
- Larynx
- Guttural pouches



# Normal anatomy & physiology

- Respiratory muscles (diaphragm) provide force for ventilation
  - Inhalation: negative pressures – air moves into lung
  - Exhalation : positive pressures – drives air out
- At rest
  - Respiratory rate 15 bpm
  - Tidal volume 5L
  - Minute ventilation 75L
- At exercise
  - Minute ventilation 1500L i.e. 20X increase
  - Inhalation pressure in trachea 15cm H<sub>2</sub>O
  - Exhalation -30cm H<sub>2</sub>O

# What happens when it doesn't function normally?

- Upper airway not ideally designed for any one activity
- Features:
  - High dead space volume
  - High resistance to airflow
  - High negative pressures can cause collapse of the tissues
- Upper airway may limit the horses exercise capacity
- Minimal tolerance i.e. a small lesion may significantly compromise the horses ability to perform at maximum exercise capacity

# Abnormal anatomy & physiology

- A small decrease in the caliber of the upper airway can significantly increase resistance to flow & limit performance
  - Conditions such as RLN narrow the airway lumen increasing resistance to flow
  - Bernoulli effect results in a vicious cycle of reduced cross sectional area, increased air velocity and increased pressure changes causing dynamic collapse of the airway
- Other species can switch to mouth breathing – making it easier to get greater airflow required
- The horse cannot do this – obligate nasal breather

# Why is URT disease significant?

- URT disease is a significant problem in the horse
  - Limits exercise capacity causing **poor performance**
  - Can be **life threatening**
    - Tracheotomy required if severe URT obstruction
    - Fatal epistaxis may occur in cases of GPM unless treated



# Overview of the approach to diagnosis of URT disease

- **History**
  - General medical history
  - More specific history related to suspected URT problems
- **Clinical examination**
  - General clinical examination
  - Detailed examination of the head & palpation of the larynx
  - Observation at exercise
- **Other diagnostic tests**
  - e.g. radiography, endoscopy

# Approach to diagnosis of URT disease

- Determine the presenting complaint
  - Nasal discharge
  - Respiratory distress
  - Exercise intolerance / noise at exercise
- Is the situation potentially life-threatening requiring immediate first-aid treatment?
  - Profuse epistaxis
  - Severe dyspnoea

# History

## General history

- Signalment & use
- Horses general health
- Management

## Specific history

- Respiratory noise
- Exercise intolerance
- Coughing
- Nasal discharge & type of discharge
- Eating and drinking normally
- Previous medical treatment / surgery

# HISTORY

- **Nasal discharge**
  - Unilateral / bilateral
  - Nature of discharge
    - Serous / blood / purulent / food material
  - Recent URT infection
  - Recent transport / head trauma
  - Associated with exercise
  - Any coughing / respiratory noise
  - Any facial swelling noted



# History

- RESPIRATORY NOISE

- When does it occur (at rest / exercise)?
- If at exercise, what pace does it occur at?
- Is the noise inspiratory / expiratory / both?
- What does the noise sound like?
  - Whistle / roar / gurgle / snoring
- Is it continuous / intermittent?
- If at exercise, does the horse stop / slow down when the noise occurs?
- Does the noise disappear once the horse's speed reduces?
- Does this noise appear to limit the horses performance?
- Does the horse recover normally after exercise?

# Clinical examination

- General physical examination
  - Identify any signs of concurrent disease
  - Respiratory rate & character
  - Auscultation of thorax
  
- *Remember to assess for other causes of poor performance such as:*
  - *Lameness*
  - *Cardiac disease*



# Clinical examination

- Detailed examination of the head
  - Symmetry
  - Nasal / ocular discharge
  - Airflow from both nostrils
  - +/-Percussion of sinuses
  - Palpation of larynx
  - Evidence of previous surgical scars



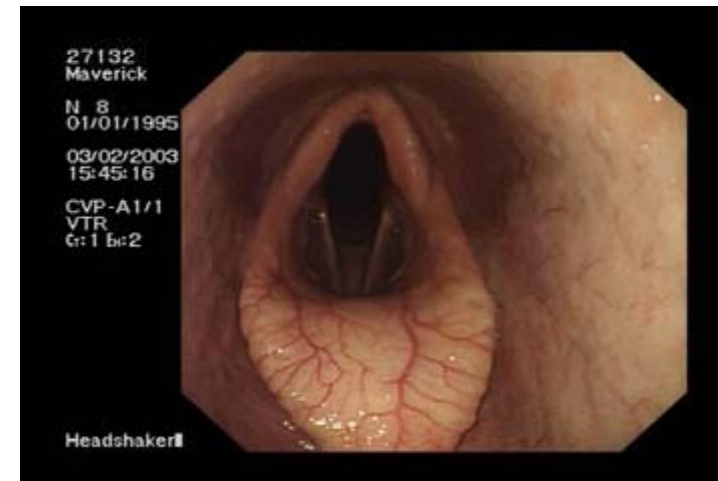
# Palpation of the larynx

- Palpation of the dorsal larynx
- Feel for muscular process
  - Assess symmetry
  - In RLN, atrophy of the left CAD makes it easier to palpate the muscular process on the LHS
- Can feel for ‘flickering’ of muscular process on slap test
- Look / feel for scars



# The slap test

- Thoracolaryngeal test
  - Assesses function of recurrent laryngeal nerve & laryngeal adductor muscles
- Palpate the dorsal laryngeal area on one side
- An assistant slaps the saddle area on the contralateral thorax
- Normal horses
  - The slap induces transient adduction of the opposite arytenoid cartilage (felt as a flicker under the examiners finger / can be seen endoscopically)
- Abnormal horses
  - No adduction evident
  - Indicates laryngeal paresis / paralysis



# Examination at exercise

- Can determine nature of noise
- Expiration occurs as the leading leg hits the ground at canter & gallop
- Some sounds heard at exercise are normal:
  - Snorting
  - ‘High blowing’
  - Sheath noise
  - ‘Thick wind’



# Abnormal respiratory noises at exercise

## Inspiratory

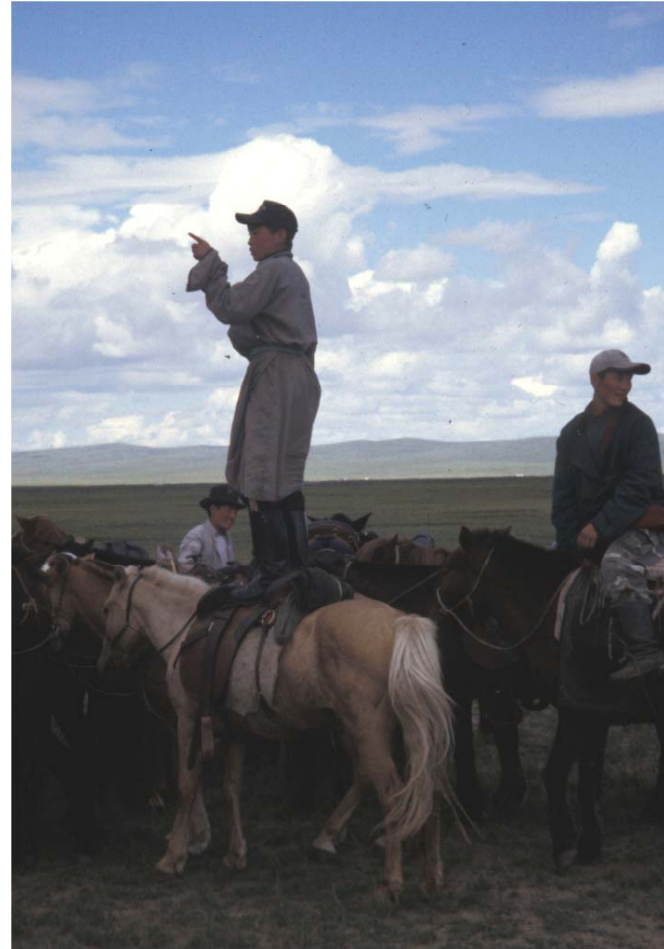
- RLN
- DDSP (soft gurgling)
- Epiglottic entrapment
- Subepiglottic cyst
- Epiglottic retroversion
- Dynamic nasopharyngeal collapse
- Aryepiglottic fold collapse
- Alar fold collapse / nasal paralysis
- 4-BAD

## Expiratory

- DDSP (loud)
- Epiglottic entrapment
- Epiglottic retroversion
- Sub-epiglottic cyst
- 4-BAD

# Further diagnostic tests

- ENDOSCOPY
- RADIOGRAPHY
- Sinoscopy
- Ultrasonography
- CT / MRI
- Scintigraphy



# Endoscopy

- Most important tool in the investigation of URT disease
- Ideally perform without sedation
  - Particularly if assessing laryngeal function
- Twitch if necessary



# Endoscopy

- Examination of both nasal passages
  - Identification of any abnormal masses / swellings
- Examination of the sinus drainage angle & guttural pouch ostia
  - any evidence of discharge (e.g. blood / purulent material)
- Examination of the nasopharynx
  - Abnormal masses / soft palate position / collapse of walls
- Examination of the larynx
  - Grading of laryngeal movement

# Treadmill endoscopy

- Important tool for the assessment of poor performance at exercise
- Only way of identifying causes of URT obstruction that only occur at exercise
  - **Intermittent DDSP**
  - **Dynamic nasopharyngeal collapse**
  - **Vocal fold / arytenoid cartilage collapse**
  - **Intermittent epiglottic entrapment**
  - **ADAF**
  - **Epiglottic retroversion**



# Treadmill endoscopy



# Radiography

- Good for assessing areas of the URT that cannot be assessed endoscopically e.g. paranasal sinuses
- Interpretation can be difficult due to overlap of multiple structures

## INDICATIONS INCLUDE:

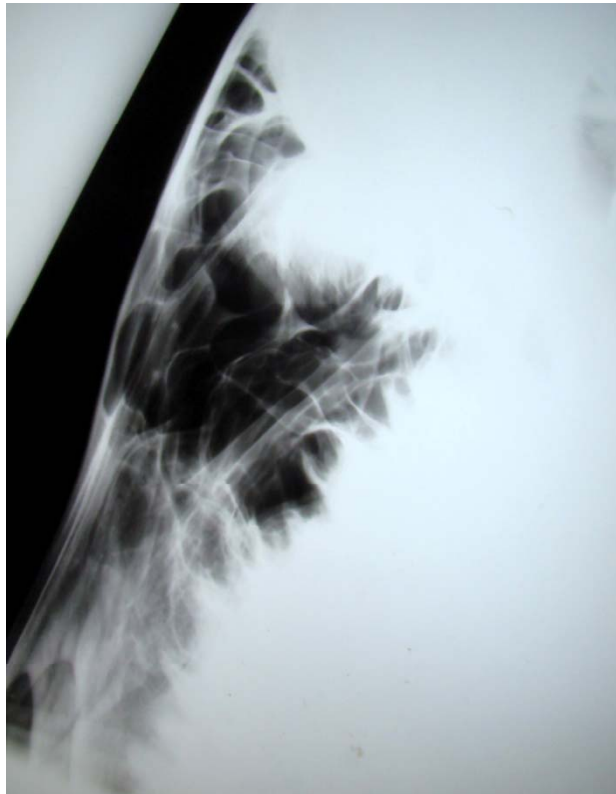
- Facial / mandibular fractures
- Suspected paranasal sinus disease
  - Nasal discharge
- Suspected dental disease (periapical infection)
  - Nasal discharge (caudal cheek teeth)
  - Facial swelling (rostral cheek teeth)
- Investigations of bony swellings



# Radiography

## LATERAL VIEW

- Good for assessing the paranasal sinuses, guttural pouches & pharynx



# Radiography

## LATERAL OBLIQUE VIEWS

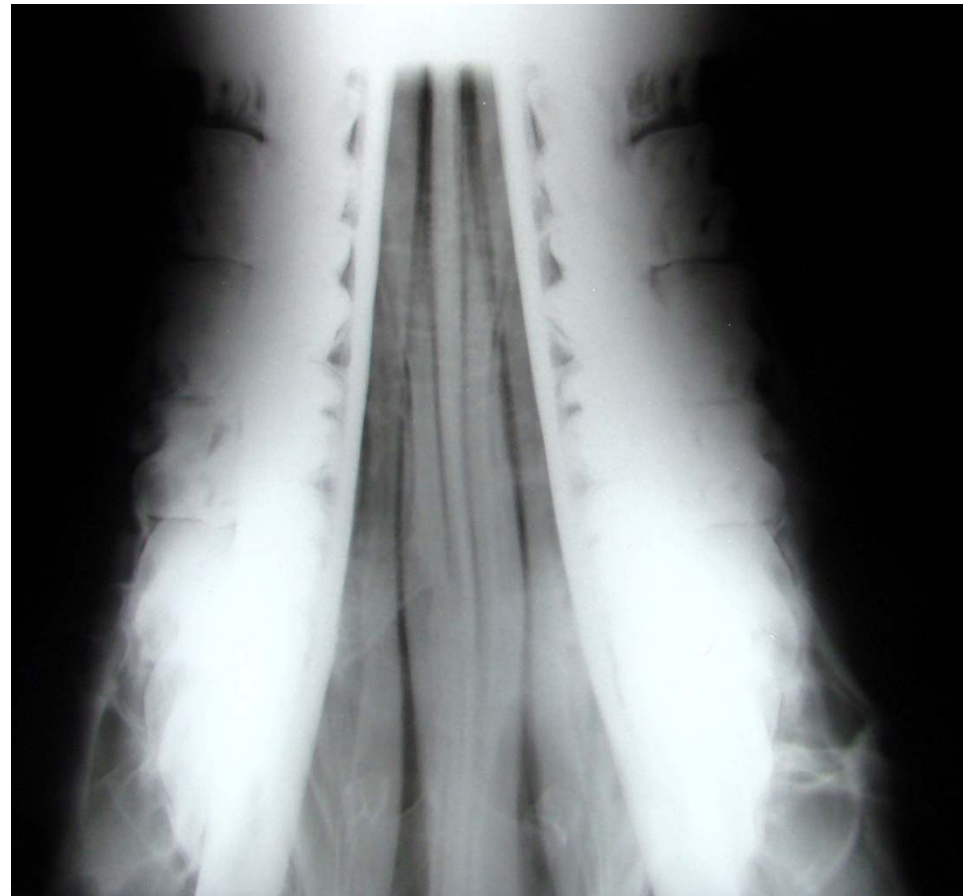
- Used most commonly to assess the periapical regions of the premolars and molars (prevents superimposition)



# Radiography

## Dorso-ventral view

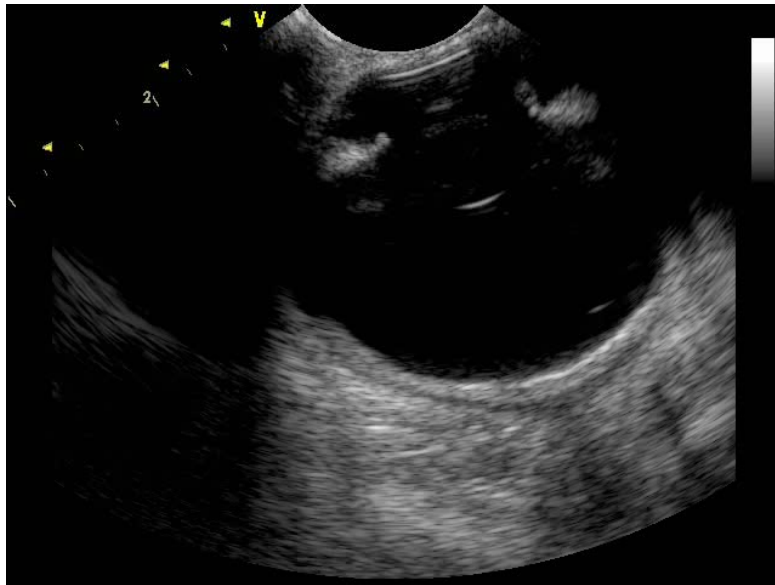
- Assessment of paranasal sinuses, nasal septum and teeth
- Helps to decide if lesions unilateral / bilateral



# Ultrasonography

- Infrequently indicated in examination of the URT
- **INDICATIONS:**
  - Soft tissue swellings of the head / neck
  - Assessment of the larynx
  - Assessment of facial fractures
  - Examination of the eye & periocular tissues
  - Suspected temporo-mandibular joint disease

# Ultrasonography

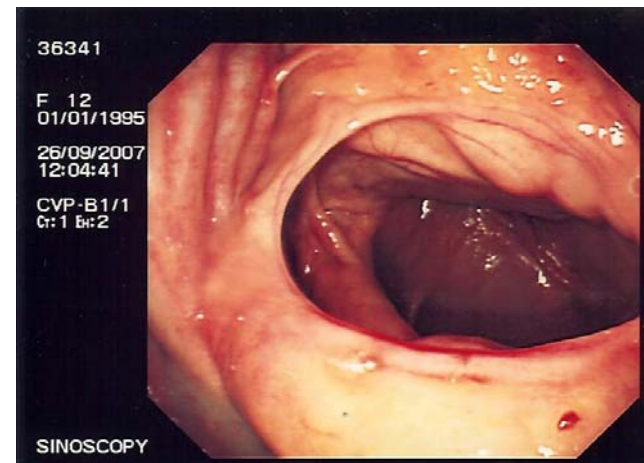


# Sinoscopy

- Enables the paranasal sinuses to be examined directly using a rigid arthroscope/ flexible endoscope

## INDICATIONS:

- Investigation of suspected paranasal sinus disease
- Aspiration of material from paranasal sinuses (e.g. culture & sensitivity)
- Obtaining material for biopsy



# Computed Tomography

- Major advantage of providing cross-sectional images with superior resolution to normal radiographs
- Avoids the problems associated with superimposition of structures which is a big problem when interpreting conventional head radiographs
- Disadvantages:
  - Performed by few centres
  - May require general anaesthesia
  - Expensive

# Computed tomography

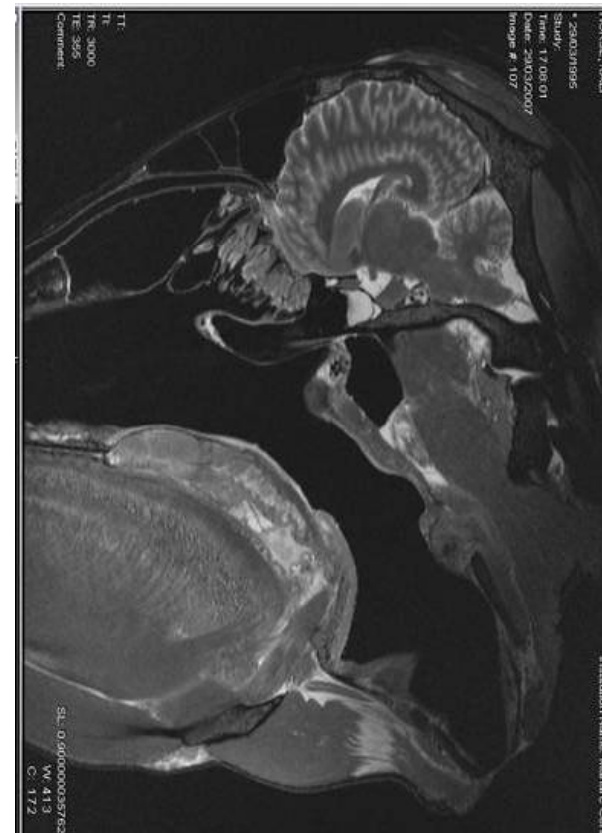
## INDICATIONS:

- Investigating possible periapical infection (& identification of tooth) in cases of sinusitis
- Investigation of masses within the paranasal sinuses (location, extent) to assist surgical planning / treatment



# Magnetic resonance imaging

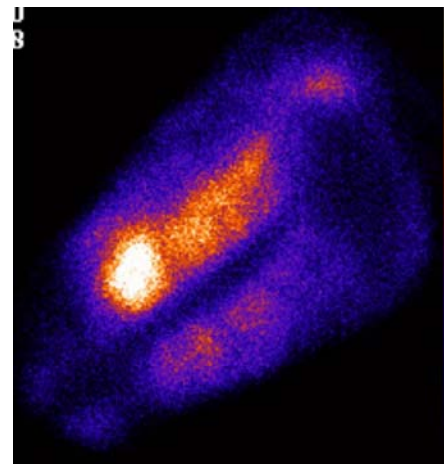
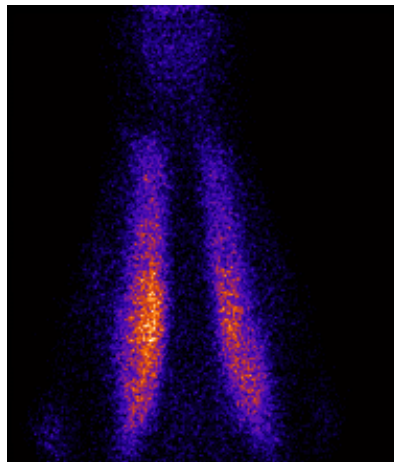
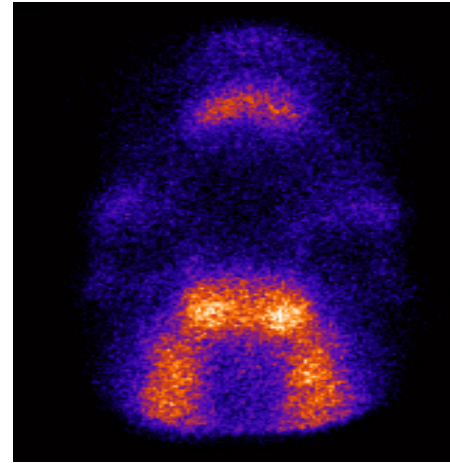
- Rarely performed in the equine head & neck
- Rarely indicated clinically
  - Suspected brain tumour
  - Investigation of masses
- Few facilities perform MRI of the equine head
- Expensive
- Requires general anaesthesia



# Scintigraphy

- Same principles as for scintigraphy for the investigation of orthopaedic disease
  - Bone-seeking agent attached to gamma emitting radioisotope
  - Increased uptake in area of abnormal bone activity
- Indications:
  - Differentiation between primary / secondary sinusitis (secondary to PAI)
  - Identification of correct tooth
  - Suspected TMJ disease

# Scintigraphy



# SUMMARY

- The horse is an obligate nasal breather
- Any compromise of URT is poorly tolerated
- URT problems are common in the horse and depending on the lesion may present as nasal discharge / respiratory noise / facial swellings or poor performance
- It is important to take complete history & perform a thorough clinical examination
- Endoscopy & radiography are the principle imaging modalities for investigating the URT