

# Fever in the Pediatric Office Practice

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*J Pediatr (Rio J) 2003; 79 Suppl 1:S55-S64*



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# Abstract

## Objective:

1. To determine how to select a child who requires in depth laboratory investigation, defining the most appropriate laboratory screening test
2. To detect the individual who requires immediate therapy, when fever is the main symptom
3. To provide suggestions on how to deal with fever, and with the anxiety it causes

# All about fever

Fever - a warning sign

- ❑ 20-30% of pediatric appointments
- ❑ Accompanied by a strong feeling of anxiety
- ❑ Pediatrician's duty to select those that require further investigation, detect the severe cases demanding immediate intervention and properly manage common episodes

# All about fever

- Controlled rise in body temperature above normal values for an individual
- Varies within certain thresholds according to certain factors:
  - ❑ Age
  - ❑ Circadian rhythm
  - ❑ Type of reading

# All about fever

- **Body temp** - regulated by thermoregulatory center, balancing heat gain and heat loss
- **Pathogenic sequence:** infectious and noninfectious agents work as exogenous pyrogens which causes phagocytes to produce protein-rich substances (endogenous pyrogens) which in turn stimulate production of prostaglandins that act on thermoregulatory center

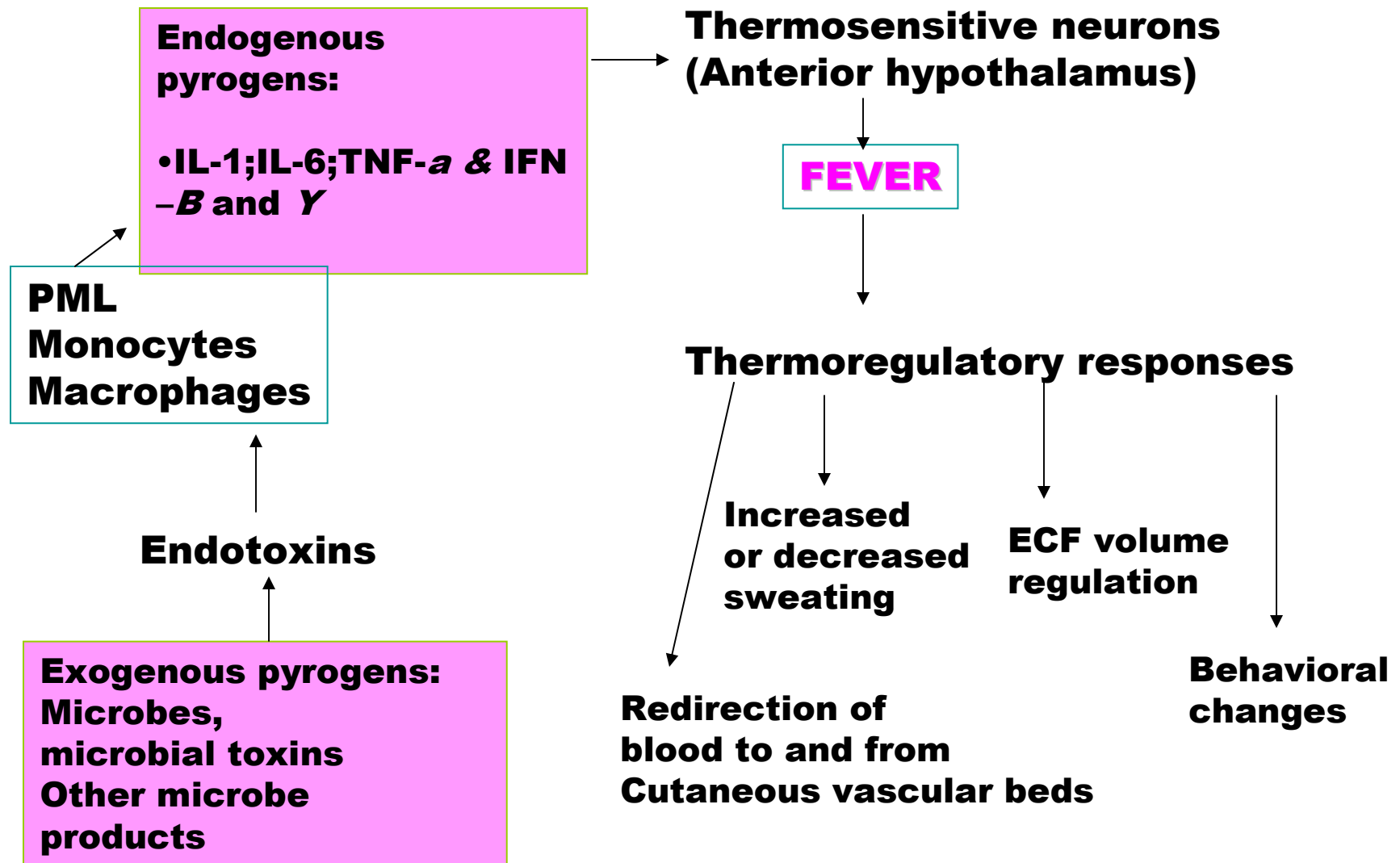
# All about fever- Friend or Foe?

- Fever is a foe but not as much we believe it to be because,
  - ❑ fever increases oxygen uptake and impairs cardiac output
  - ❑ Fever may cause seizures esp in genetically susceptible children
  - ❑ High fever  $>41.5^{\circ}\text{C}$  may cause brain injury (uncommon)

# All about fever

- Fever is a friend but not as much as we believe it to be, because:
  - Experimental evidence that high temp are associated with decrease of microbial and viral reproduction and increase in immunologic activity
  - Antipyretics may mask severity of disease

# Why Fever Occurs





# Sources of Fever

## Physiologic Fever

### States:

- digestion
- exercise
- ovulation
- pregnancy
- warm environment
- emotion

## Pathologic causes:

- Infection
- Inflammation e.g. connective tissue disease
- Neoplasms
- Vaccines
- Dehydration

# All about fever

- Fever for over 72 hrs. is probably nonviral
- Fever with shivering is usually of bacterial etiology
- Consider UTI in infants with fever and moderate infectious state without constitutional signs
- CSF is mandatory in febrile children in case of: seizure in infants < 6 mos. old, seizure that occurs 24 hrs. after fever resolutions; fever and meningeal signs and/or mental status disorders; fever in newborns

## How to Detect the Infectious State

- Fever is the most characteristic data, but it is not universal
- Loss of appetite (occurs in all cases)
- Changes in behavior: listlessness, irritability (important though subjective)
- Grunting: occurs in more severe cases and is life-threatening

## Quantify the severity of the Infectious state

- Mild – fever up to 38.5<sup>0</sup>C, good general impression e.g. Viral pharyngitis, viral laryngitis, acute diarrhea. Maintain closely monitored without antibiotics
- Moderate – temp between 38.5 to 39.4<sup>0</sup>C and listlessness.  
E.G purulent tonsillitis, otitis, viral meningitis, lobar pneumonia, pyelonephritis. Consider antibiotics

## Quantify the severity of the Infectious state

- Severe – temp reaches  $39.5^{\circ}\text{C}$  or hypothermia ( $<36^{\circ}\text{C}$ ); grunting, death risk impression. Occurs in pneumonia, bronchopneumonia, purulent meningitis, epiglottitis, pyelonephritis. Hospitalize, investigate and initiate antibiotic therapy

# How to Measure the Temperature

## **Initial Anamnesis regarding the complaint of Fever at Drs. office**

1. Age – determine the age group
2. Intensity of the fever – reaches  $39.5^{\circ}\text{C}$  and whether hypothermia occurred (below  $36^{\circ}\text{C}$ )
3. Association of fever with shivering – distinguish between simple chills or muscle jerks

## **Initial Anamnesis regarding the complaint of Fever at Drs. office**

4. Appetite- clear reduction

5. Changes in behavior –  
marked irritability,  
excessive drowsiness,  
apathy, inconsolable  
crying, whining,  
hallucinations, grunting



## **Initial Anamnesis regarding the complaint of Fever at Drs. office**

6. Other constitutional symptoms: coryza, nasal discharge, sneezing, cough (airways) wheezing and breathing difficulty (bronchi), vomiting and diarrhea (GI), headache (mild, nonspecific or pronounced (CNS))

## **Initial Anamnesis regarding the complaint of Fever at Drs. office**

7. Length of the fever episode: try to find out the precise moment of fever onset. Beware of expressions like :” he has been feverish all the time” or “he has had fever for over one month,”

# When Immediate Investigation is Indicated

1. Age of risk:
  - newborn - obligatory investigation
  - first 2 mos - recommended investigation
  - third month of life - closely monitored (if general impression is satisfactory).
  - After 3 mos - OPD observation with easily available and programmed access

## When Immediate Investigation is Indicated

2. Fever higher than  $39.4^{\circ}\text{C}$  –  
esp. if accompanied by shivering: suggest bacterial infection/bacteremia. In unwell children also if temp below  $36^{\circ}\text{C}$

## When Immediate Investigation is Indicated

3. Pronounced infectious/toxemic state: poor general impression, listlessness, lack of appetite, irritability alternated with drowsiness, lethargy, apathy, suffering appearance, inconsolable crying or whining, grunting (warning sign) and child's enthusiasm

## When Immediate Investigation is Indicated

4. Length of fever greater than three days (over 72 hours) counted as accurately as possible from the presumed onset of fever
  - Viral infections cause fever up to 3 days duration
  - After 3 days consider UTI esp <2 y with no other sx

## When Immediate Investigation is Indicated

- Infants with high fever with pronounced irritability, consider roseola
- Congested tympani in a febrile child does not characterise AOM

## How to investigate a child with fever as only complaint

- Retrospective analysis of Infants <3 mos at ER services of Children's Hospital (Boston)
- Best data to detect bacterial disease:
  - Age < 14 days
  - Rectal temp >39°C
  - Leukocytosis >20,000 and leukopenia <4,100
  - Positive urine test ( $\geq 5$  WBC/hpf)



# Assessment of Risk of Febrile Infants

Criteria	Boston <sup>a</sup>	Rochester <sup>b</sup>	Philadelphia <sup>c</sup>
Age	28-89 days	<60 days	29-60 days
Fever	≥38 <sup>0</sup> C	≥38 <sup>0</sup> C	≥ 38.2 <sup>0</sup> C
Appearance	Good	Good	Good

a Tal Y, Even L, Kugelman A et al: The clinical significance of rigors in febrile children. Eur J Pediatr 1997

b: Baskin MN, O'Rourke EJ, Fleischer GR: Outpatients treatment of febrile infants 8 to 89 days of age with intramuscular administration of ceftriaxone, J Pediatr 1992

c: Jaskiewicz JA, McCarthy CA, Richardson AC et al : Febrile infants at low risk for serious bacterial infections – an appraisal of the Rochester criteria and implications for management. Pediatrics 1994

# Assessment of Risk of Febrile Infants

Criteria	Boston <sup>a</sup>	Rochester <sup>b</sup>	Philadelphia <sup>c</sup>
Laboratory tests that define Low-risk patients			
<ul style="list-style-type: none"> <li>• Leukocytes</li> <li>• Bands (rods)</li> <li>• Bands/Segs</li> <li>• Leukocytes (urine)</li> <li>• Bacterioscopy (urine)</li> <li>• Stool/smear</li> <li>• Thoracic x-ray</li> <li>• Liquor</li> </ul>	<p>&lt;20,000</p> <p>&lt;1,500</p> <p>&lt;10/field</p> <p>w/o infiltrates</p> <p>&lt;10 WBCs/mm<sup>3</sup></p>	<p>&gt;5,000 and &lt;15,000</p> <p>&lt;1,500</p> <p>&lt; 10/field</p> <p>&lt;5 leukocytes per field</p>	<p>&lt;15,000</p> <p>&lt;0.2</p> <p>&lt;10/field</p> <p>negative</p> <p>No blood &amp; WBCs</p> <p>w/o infiltrates</p> <p>&lt;8 WBCs/mm<sup>3</sup></p> <p>( - )bacterioscopy</p>

# Assessment of Risk of Febrile Infants

Criteria	Boston <sup>a</sup>	Rochester <sup>b</sup>	Philadelphia <sup>c</sup>
<b>MANAGEMENT</b>			
<ul style="list-style-type: none"> <li>• HIGH RISK</li> <li>• LOW RISK</li> </ul>	Hospital + antibiotic  Home/return  Empiric antibiotic	Hospital + antibiotic	Hospital + antibiotic  Home/return    Home/return
• Sensitivity		92%	98%
• Specificity	94%	50%	42%
• Positive Predictive value	12%		14%
• Negative	9%	98.9%	99.7%

## Caution – Before infant is placed in the Low-Risk Group

- Consider Home Environment
  - reliable caregiver
  - Availability of transport
  - Means of communication

## Basic Tests

1. Hemogram: Check for leukocytosis  $>15,000$  and/or leukopenia  $<5,000$ ; neutrophilia ( $>10,000$  neutrophils), with a left shift (bands  $>1,500$ ), morphological neutrophil alterations (toxic granulations and vacuoles)
2. ESR:  $>30$  mm
3. Quantitative CRP: concentrations  $< 5$  mg/dl rule out severe bacterial infection

## Basic Tests

4. Urine test: Leukocyte count and bacterioscopy
5. CSF analysis
6. Blood culture

# Practical counseling to Parents

## Decalogue of the Febrile Child

1. If necessary, explain that it is probably a viral disease, usually benign, whose fever is limited to 3 days
2. Dress the child with light clothing, keep environment ventilated
3. Offer the child fluids regularly
4. Warn that loss of appetite is inevitable and that the child should eat what he/she tolerates better

# Practical counseling to Parents

5. Explain - moderate fever stimulates the defense mechanisms against infection thus it is not necessary to normalize the temperature completely
6. Explain - aim of antipyretics is to relieve discomfort caused by the fever and should be used only during pronounced listlessness, with no preset time, but respecting the minimum interval of each medication



# Antipyretics

Medication	Dosage (m/k/time)	Gap	Forms
ASA	10-15	4-6 hrs	Tablets
Acetaminophen	15-20	4-6 hrs	Drops, syrups, tablets, supp.
Ibuprofen	10	6 – 8 hrs.	suspension

Note:

- AAS is not recommended for suspicious cases of dengue
- Suppository might be useful for children that vomit or reject medications
- Intravenous antipyretics not recommended for OPD cases
- Concomitant and sequential use of anti-inflammatory medications with acetaminophen can have increased effect and cause hypothermia

## Practical counseling to Parents

7. Prescribe the most accessible antipyretic and consider preferences, availability, acceptance, tolerance and habitual efficiency of common antipyretics
8. Explain limited benefits of warm baths and warm compresses that may be used after antipyretic administration. Warn against the use of cold water and alcohol. Don't immerse child in a bathtub

# Practical counseling to Parents

9. Inform (orally and in writing) about the warning signs:

- ❑ **fever greater than 39.4°C with shivering,**
- ❑ **pronounced listlessness or unwellness** (drowsiness, irritability, inconsolable crying or whining, grunting) which do not resolve after the effect of antipyretics;
- ❑ **development of different symptoms;**
- ❑ **fever for over three days in a row**

**THANK YOU!!!**