A STUDY ON CORRELATION OF CORD BLOOD BILIRUBIN & NEONATAL HYPERBILRUBINEMIA IN THE SETTING OF ABO INCOMPATIBILITY

Dissertation Submitted to

THE TAMILNADU DR.M.G.R.MEDICAL UNIVERSITY

CHENNAI

In partial fulfillment of the regulations

for the award of

M.D.DEGREE IN PAEDIATRIC MEDICINE

BRANCH VII

GOVERNMENT MOHAN KUMARAMANGALAM

MEDICAL COLLEGE,SALEM

APRIL 2016

CERTIFICATE

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This is certify that this dissertation titled " CORRELATION OF CORD BLOOD BILIRUBIN & NEONATAL HYPERBILIRUBINEMIA IN THE SETTING OF ABO INCOMPATIBILITY" submitted by Dr. V.NITHYA, to the faculty of Paediatric Medicine, The Tamil Nadu Dr. M.G.R. Medical University, Chennai in partial fulfillment of the requirement for the award of MD Degree Branch VII (Paediatric Medicine), is a bonafide research work carried out by her under direct supervision and guidance.

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Dr. R. RAVICHANDRAN,M.S.,MCh.,

DEAN

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Salem.

DECLARATION

DECLARATION BY THE CANDIDATE

I hereby declare that this dissertation entitled "A STUDY ON CORRELATION OF CORD BLOOD BILIRUBIN & NEONATAL HYPERBILRUBINEMIA IN THE SETTING OF ABO INCOMPATIBILITY" is a bonafide and genuine research work carried out by me under the guidance of Dr.P.SAMPATHKUMAR,M.D.,D.C.H., Associate Professor, Department of Paediatrics, Govt. Mohan Kumaramangalam Medical Collelge, Salem.

I have not submitted this previously to this University or any other University for the award of any degree or diploma.

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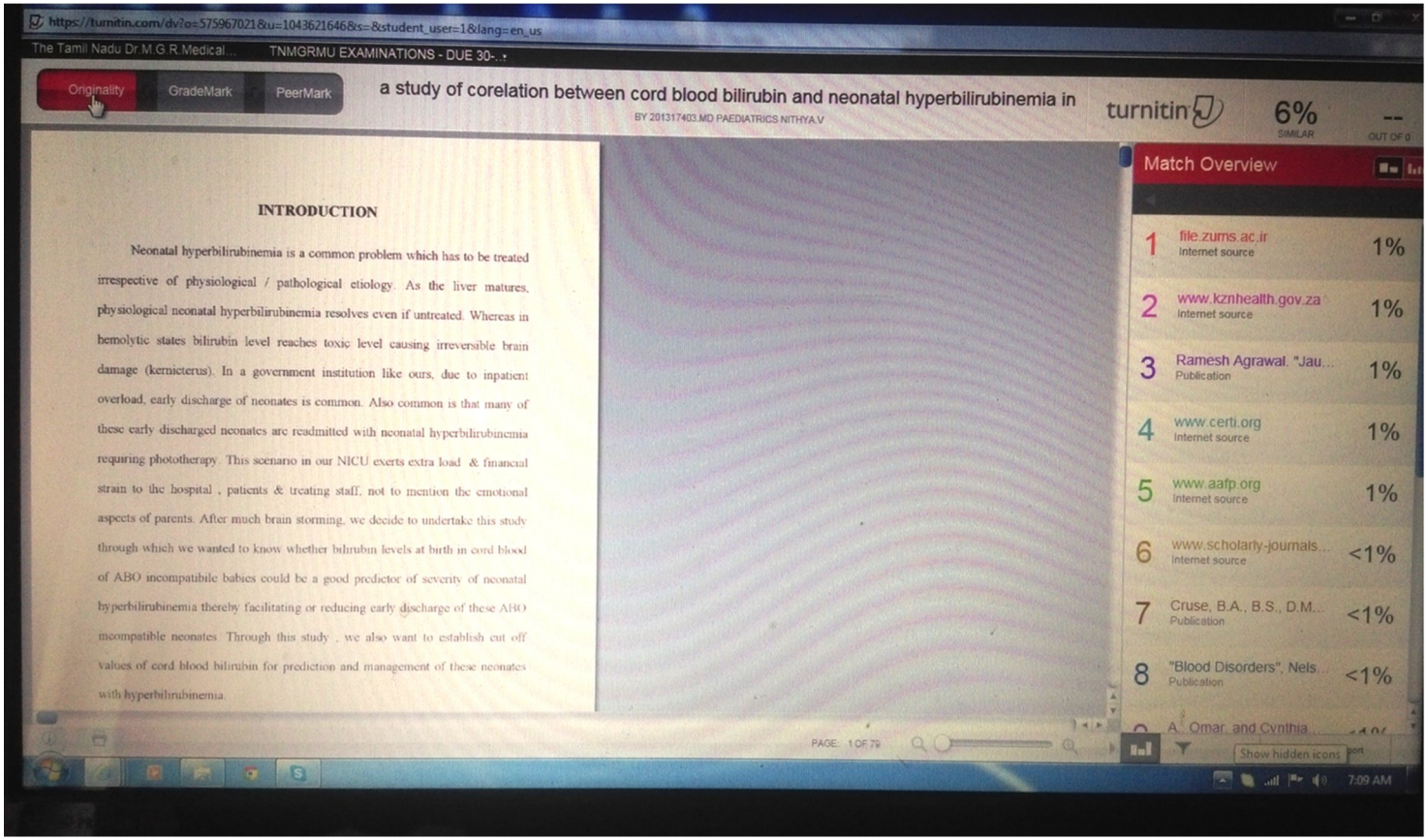
LIST OF ABBREVIATIONS

NICU	:	Neonatal Intensive Care Unit
ABO	:	blood groups
CBB	:	cord blood bilirubin
NNH	:	neo-natal hyperbilirubinemia
HDN	:	hemolytic disease of newborn
Rh	:	rhesus
RBC	:	red blood cell
CBC	:	complete blood count
MCV	:	mean corpuscular volume
HB	:	hemoglobin
PCV	:	packed cell volume
mg /dl	:	milligram per decilitre
Kg	:	kilogram
µmol/L	:	micro moles per litre
sq.cm/nm	:	square centimeter per nanometre
NADPH	:	nicotinamide adenine dinucleotide phosphate hydrogen
O2	:	oxygen
CO	:	carbon monoxide
Fe	:	iron chemical symbol
AAP	:	American academy of paediatrics

BBB	:	blood brain barrier
FFA	:	free fatty acid
CSF	:	cerebro spinal fluid
G6PD	:	glucose-6 phospate dehydrogenase
DCT	:	direct coomb’stest
BIND	:	bilirubin induced neurological delay
HPE	:	histo pathological examination
CNS	:	central nervous system
EDTA	:	ethylene diamine tetraacetic acid
TP	:	true positive
TN	;	true negative
FP	:	false positive
FN	:	false negative
NPV	:	negative predictive value
PPV	:	positive predictive value
ROC	:	receiver operating curve
LSCS	:	lower segmental caesarian section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INTRODUCTION
Neonatal hyperbilirubinemia is a common problem which has to be treated irrespective of physiological / pathological etiology. As the liver matures, physiological neonatal hyperbilirubinemia resolves even if untreated. Whereas in hemolytic states bilirubin level reaches toxic level causing irreversible brain damage (kernicterus). In a government institution like ours, due to inpatient overload, early discharge of neonates is common. Also common is that many of these early discharged neonates are readmitted with neonatal hyperbilirubinemia requiring phototherapy. This scenario in our NICU exerts extra load & financial strain to the hospital , patients & treating staff, not to mention the emotional aspects of parents. After much brain storming, we decide to undertake this study through which we wanted to know whether bilirubin levels at birth in cord blood of ABO incompatibile babies could be a good predictor of severity of neonatal hyperbilirubinemia thereby facilitating or reducing early discharge of these ABO incompatible neonates. Through this study , we also want to establish cut off values of cord blood bilirubin for prediction and management of these neonates with hyperbilirubinemia.
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Ethical Committee Meeting held on 08.01.2015 at 11.00 A.M in the Seminar Hall, IInd Floor, Medicine Block, Govt. Mohan Kumaramangalam Medical College Hospital, Salem 01.

The following Members were attended the Meeting.

MEMBERS:

1. Dr. N. Mohan, MS.,FICS.,FAIS.,FMMC., Dean, Govt. Mohan Kumaramangalam Medical College, Salem.
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Sl. No.	Name of the Presenter with Address	Title	Name of the Guide and Address	Whether it is Approved or not.
1.	Dr. V. Nithya, II Year MD., P. G. Student, GMKMC, Salem – 30.	Study of correlation of cord blood bilirubin & neonatal hyperbilirubinemia in newborns with ABO incompatibility in GMKMCH	Dr. P. Sampath Kumar, MD., Professor of Paediatrics Department, GMKMC, Salem.	Approved

The Ethical Committee examined the studies in detail and is pleased to accord Ethical Committee approval for the above Post Graduate of this College to carry out the studies with the following conditions.

1. She should carry out the work without detrimental to regular activities as well as without extra expenditure to the institution to Government.
2. She should inform the institution Ethical Committee in case of any change of study procedure site and investigation or guide.
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CONTENTS

NTRODUCTION

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OBJECTIVES

OBJECTIVES

Aim of the study:

- To establish a strong correlation between Cord blood bilirubin & neonatal hyperbilirubinemia in ABO incompatibility.
- To determine cut off values of Cord blood bilirubin & 24hrs bilirubin levels as predictors of neonatal hyperbilirubinemia in ABO incompatibility
- Early detection of neonatal hyperbilirubinemia to prevent the debilitating complications like kernicterus.

REVIEW OF LITERATURE

REVIEW OF LITERATURE

Neonatal Hyperbilirubinemia (NNH) is defined as the total serum bilirubin >5mg/dl. It is a commonly encountered problem. These may be as varied as physiological and pathological based on etiology. The incidence of clinical jaundice in the first week of life is found to be 60%. Among these jaundiced neonates , few have pathological etiology such as hemolytic disease of newborn (HDN), infections, metabolic disorders, endocrine abnormalities and congenital hepatic disorders.

Clinically jaundice is the manifestation of unconjugated bilirubin deposit in skin and mucous membrane. Kramer et al has laid down guidelines for diagnosis of these bilirubin deposits in the skin based on the colour.

These pathological cases are defined as those cases of hyperbilirubinemia which requires treatment. They may be conjugated or direct hyperbilirubinemia or indirect or unconjugated hyperbilirubinemia. The following are the enumerated causes of neonatal Hyperbilirubinemia.

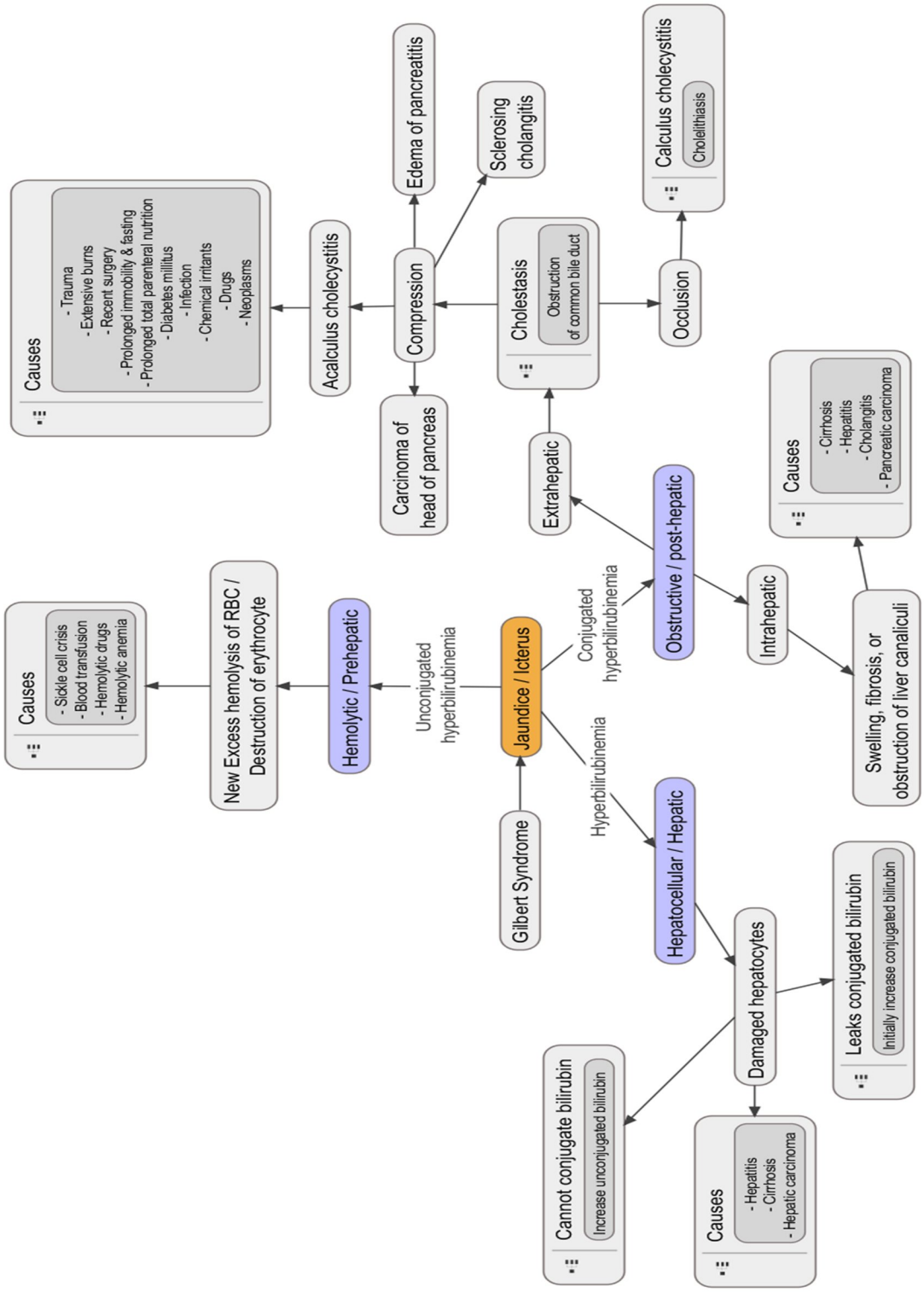


FIG : 1 CAUSES OF NEONATAL HYPERBILIRUBINEMIA

Risk factors for neonatal hyperbilirubinemia:

Maternal factors:

1. Feto-maternal blood group incompatibility
2. ABO incompatibility
3. Rh incompatibility
4. Gestational diabetes
5. Drugs- oxytocin, diazepam

Neonatal factors:

1. Birth trauma- bruising, cephalhematoma, instrumental delivery
2. Infections
3. Polycythemia
4. Drugs
5. Infrequent feeding
6. Prematurity
7. Previous affected sibling

Pathophysiology of Jaundice:-

In the human circulation, senescent RBC's are broken down in the spleen resulting in degraded product producing heme. This heme is phagocytosed by mononuclear cells and with the help of microsomal enzyme, heme oxygenase converted to biliverdin. Carbon monoxide , released in this reaction, is exhaled through lungs.

One mole of hemoglobin produces one mole each of bilirubin & Carbon monoxide which inturn is reduced by bilirubin reductase & converted to bilirubin. 75% of this bilirubin is released from senescent RBC in the reticuloenothelial system.

1g of HB produces 34mg(600µmol) bilirubin.in this degradation.

Accelerated release of Hb from RBC is the cause of hyperbilirubenemia in isoimmunisation (Rh, ABO incompatibility),

25% of bilirubin is called early labeled bilirubin derived from Hb released by ineffective erythropoietin in the bone marrow, further heme containing protein in tissues (eg. Myoglobin, cytokines, catalase, peroxidase) and frEee from heme.

At physiological pH, the insoluble bilirubin binds itself to albumin for transportation in the circulation.

This splenic circulation is brought to the liver, where hepatic conjugation with glucuronic acid (GLUCURONIDATION) occurs and bile is produced. This is secreted in the intersitium and executed via the biliary cannaliculi subsequently into bile duct.

FIG : 2 BILIRUBIN FORMATION

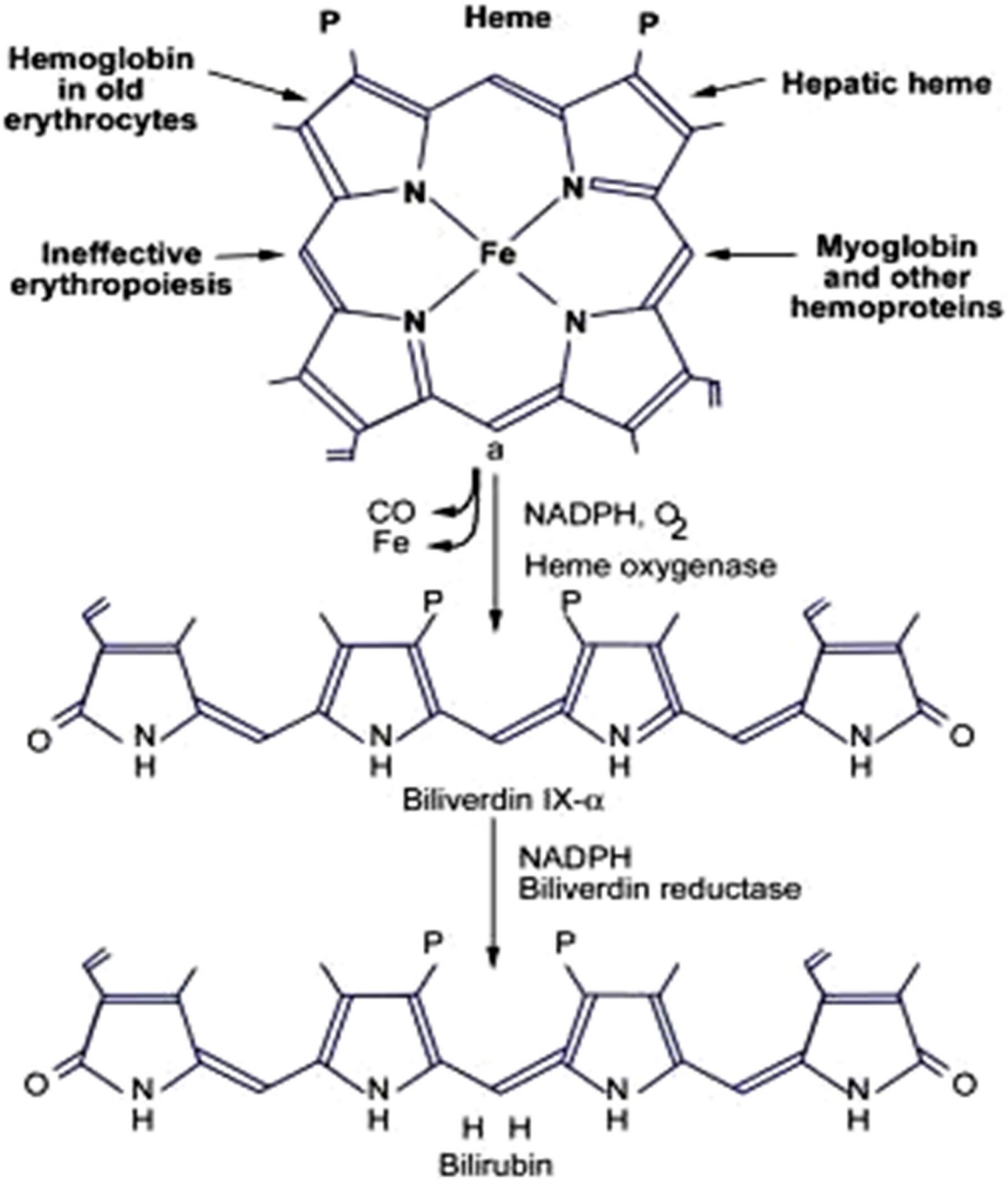
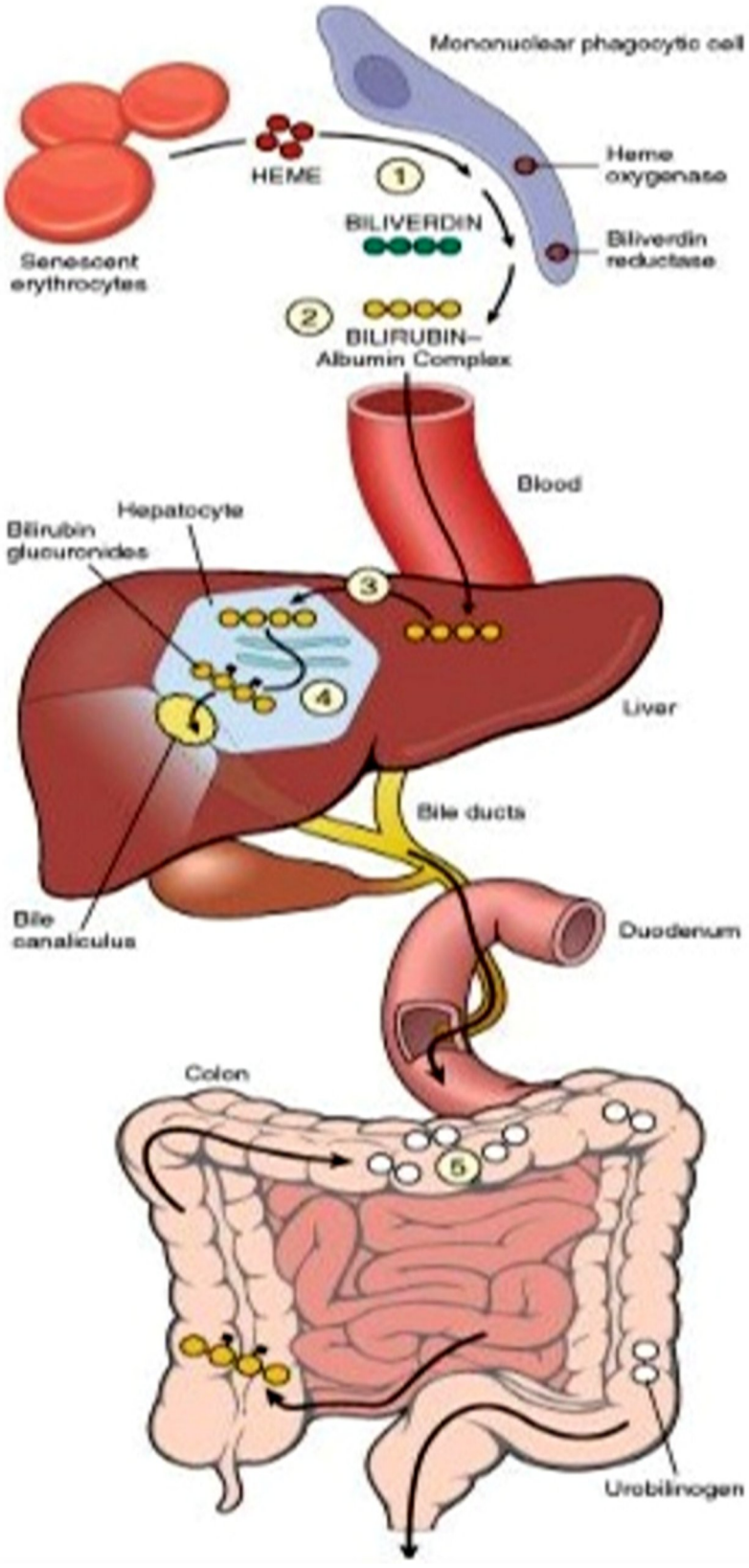


FIG : 3 HEME METABOLISM



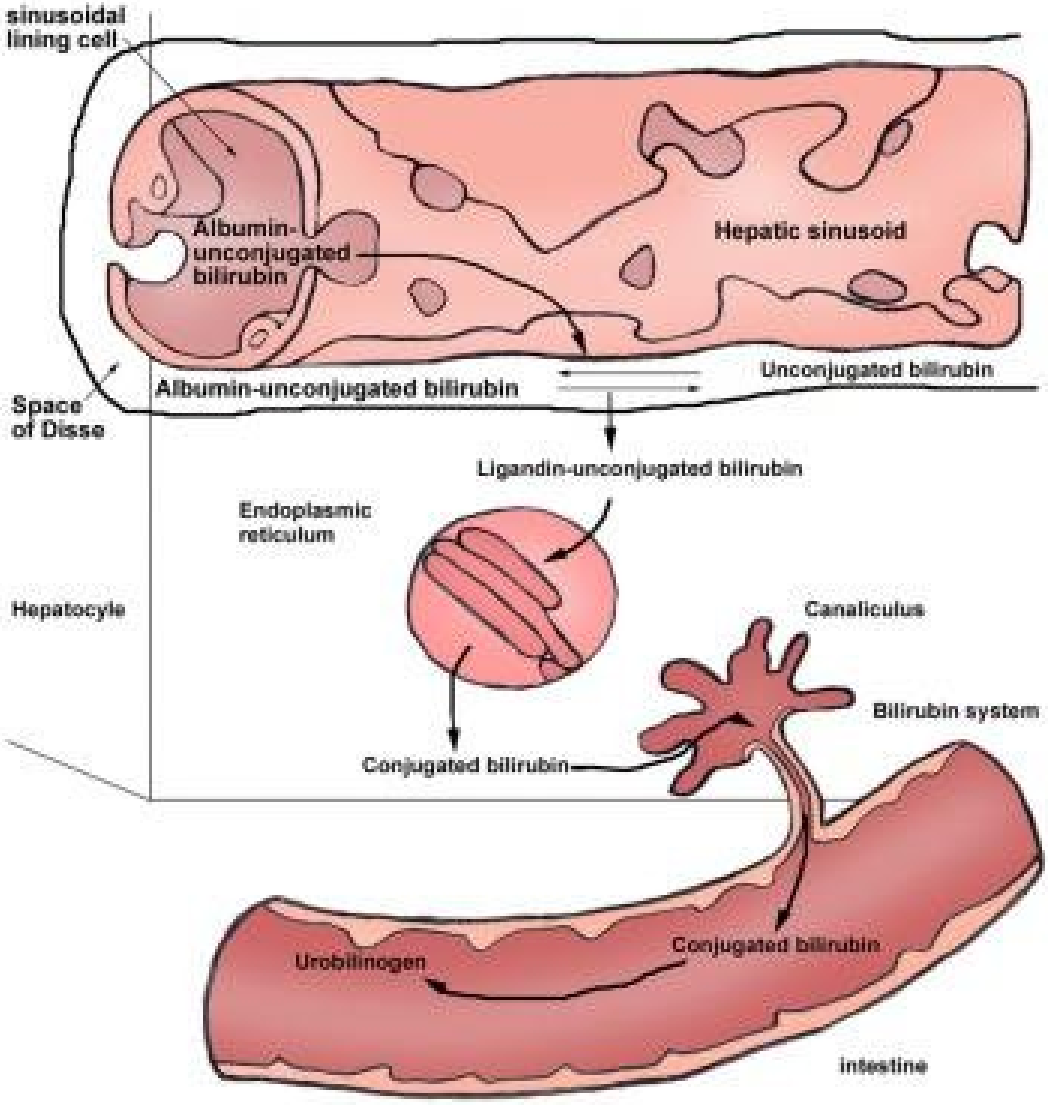


FIG : 4 CIRCULATION OF BILIRUBIN

The bile secreted via bile ducts into second part of duodenum is converted in the colon by bacterial proteases into urobilinogen and stercobilinogen which is metabolized into Urobilin and Stercobilin which adds characteristic colour to the urine and fecaes respectively.

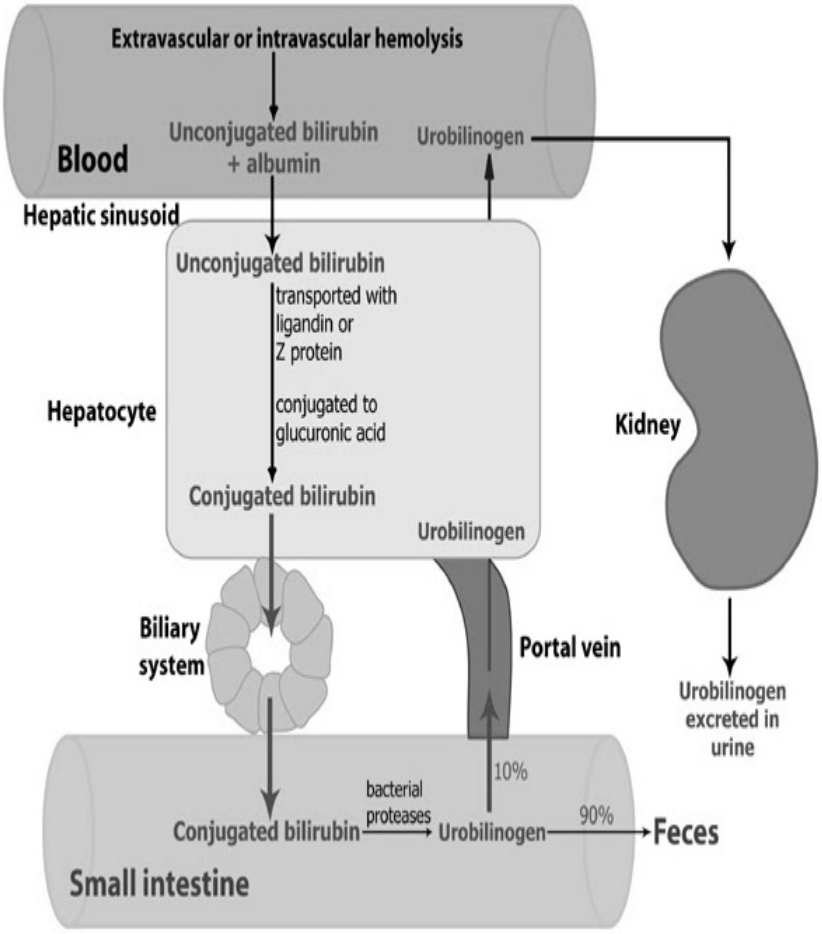


FIG : 5 CONJUGATION OF BILIRUBIN

10% urobilinogen reabsorbed into circulation, adding colour to urine. The rest of 90% urobilinogen is converted to stercobilin.

In the new born, there is relative polycythemia with shorter RBC life span (80 days in new born and 120 days in adults). This results in increased RBC turnover in the new born, thereby producing double amount of bilirubin compared to adults. Hence serum bilirubin levels are increased in newborn in later life. Increased enterohepatic circulation, immature hepatic update and conjugation also contributes. This combination of factors results in a normal physiological hyperbilirubinemia common in newborn. This is quite harmless and manageable.

Physiological Jaundice:-

Physiological Jaundice is due to immature hematological systems appears between 1 – 3 days. Reaches its peak 5 – 6 mg/dl (86-103 µmol/L) by 3 - 4^{th} day and regresses by 14^{th} day of life. It occurs due to unconjugated hyperbilirubinemia and usually bilirubin is <15mg/dl. It is more seen in artificial feeding. In term healthy neonates without hemolysis , upto 17 mg/dl (291µmol/L) bilirubin levels are termed as normal (as per AAP recommendation). Whereas in preterm neonates safe level vary based on gestational age. Healthy term baby is the born at term in absence of any hemolysis or significant illness. When total serum bilirubin level is <4mg/dl , clinically there is no icterus.

Breast Feeding Jaundice:

Compared to artificially fed babies, breastfed babies follow a different jaundice progression. In breastfed neonates, jaundice appears at 1 – 3 days and peaks by two weeks of life, regresses by 3^{rd} week of life. Comparatively they tend to have higher bilirubin levels. This pattern is not due to breast milk person but because of frequency of breast feeds. Reduced

frequency is associated with increased physiological jaundice. Hence 10 – 12 feeds/day is recommended in a term healthy baby.

Breast milk Jaundice:-

Breast milk jaundice is diagnosed wherever unconjugated hyperbilirubinemia occurs in a good vigorous healthy feeding baby who is gaining weight adequately and all other causes of hyperbilirubinemia have been excluded. These infants have higher bilirubin due to Beta - glucuronidase in breast milk. They also have lesser intestinal bacteria, therefore, excrete less in stool.

Pathological Jaundice:-

Hyperbilirubinemia which requires intervention is defined as pathological jaundice

> appears of jaundice within 24 hours

- > with per day increase of serum bilirubin > 5mg/dl/day
- > peak level well above the expected range
- > continuation of clinical jaundice > two weeks with conjugated bilirubin (> 14 days in problem and 8 days in term neonates)

Hemolytic disease is the most common cause of pathological jaundice. It includes - Rh isoimmunisation

- ABO incompatibility
- G6PD
- Other minor blood group incompatibility

Rh Incompatibility:-

Babies born to a Rh positive father and Rh negative mother have Rh isoimmunisation. These neonates are screened with blood group and typing & Direct Coomts Test (DCT) on cord blood. In addition, PCV and serum bilirubin also estimated in same sample. Once these are diagnosed, reticulocyte count is done before every exchange transfusion is carried out. Intensive phototherapy from birth and continued with serial bilirubin monitoring. Bilirubin level of 0.5 X birth weight is rough guidance for phototherapy. Serum bilirubin of more than 1% of birth weight is a rough guidance for exchange transfusion. Immunoglobulin can be started at a dose of 500 mg/kg Q 12 hrly for two doses after the first transfusion.

ABO incompatibility:-

ABO incompatibility is the most common cause of hemolytic disease of newborn. The discovery of ABO blood grouping systems in 1901 by Karl Landsteiner was a major breakthrough in hematology.

Apart from the ABO systems, he also reported antibodies against these A, B antigens. This landmark discovery of antibodies against blood group antigens is the basis for various blood group incompatibility disorders. We know that 'O' group individuals have anti-A, anti-B antibodies. This incompatibility is one of the reasons for Hemolytic disease of Newborn.

In 1761, Morgagni described hemolytic disease as icterus gravid neonatarum. Historically, the most important cause of severe jaundice was Rh isoimmunisation. After the advents of anti-D prophylaxis in Rh negative woman, ABO incompatibility became the most common cause of hemolytic jaundice. Hemolysis occurs due to ABO incompatibility where anti-A, anti –B antibodies cross the placenta & sensitise the A / B / AB infant. In A /B group

mother , antibodies are IgM variety whereas IgG are formed in O group mothers. Only a small amount of antibodies cross placenta & bind fetal RBC where the expression of A/ B antigen is less mature. Therefore affected neonates will have less significant hemolysis compared to Rh affected neonates. ABO can affect the first born & as well as subsequent newborns with equal frequency. Due to low antigenicity it is not possible to evaluate ABO hemolytic disease antenatally.

ABO incompatibility protects against Rh isoimmunisation since anti-A, anti-B antibodies in mother destroys incompatible fetal cells which enters maternal circulation. Due to unexplained reasons B-O incompatibility is more severe than A-O incompatibility.

Sensitisation of the mother can happen by

- Previous transfusion
- Ectopic pregnancy
- First trimester abortion
- Amniocentesis
- Manual extraction of placenta
- Extensive version procedure

Minor group incompatibility, G6PD deficiency, hereditary spherocytosis should all be considered in infants with family history / geographical origin.

Clinical examination of jaundice:

Prerequisites:

Examination in good day light. Skin should be blanched with digital pressure. colour of skin & subcutaneous is noted. Using a rough guidelines bilirubin level estimated as noted in the picture. Yellow discolouration below thigh needs for emergency biochemical confirmation of bilirubin level.

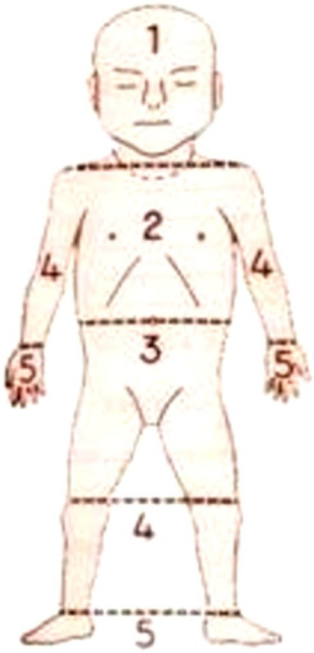
Kramer et al classically described the clinical examination of jaundice.based on skin staining of bilirubin which is used as a clinical tool to assess level of jaundice. This development of staining progresses in a cranio caudal direction.

Kramer's rule is not applied if

- **Neonate is on phototherapy**
- **Newborn Is dark skinned**

There are more objective methods of measuring the skin colour and pigmentation. This includes

- spectrometry and
- trans bilinometer



Grade	Extent of Jaundice
0	None
1	Face and neck only (4 - 6 mg/dl)
2	Chest and back (6 - 8 mg/dl)
3	Abdomen below umbilicus to knees 8 - 12 mg/dl)
4	Arms and legs below knees (12 - 14 mg/dl)
5	Hands and Feet (>15 mg/dl)

FIG : 6 KRAMER'S RULE - Clinical diagnosis of NNH

Bilirubin toxicity:-

The predominant toxicity of unconjugated bilirubin is through neurological injury. There are multiple mechanisms through which the bilirubin enters the brain, as previously elucidated, bilirubin in circulation is bound to albumin complex. The unbound excessive lipophilic free bilirubin enters the blood brains barrier and precipitate on lipid membranes in low pH. Another propounded theory is that the albumin-bilirubin complex transfers the bilirubin by cellular surface contact. This mechanism is enhanced by a damaged BBB.

- **Hypoalbuminemia:** Estimation of albumin level is also important in determining free lipophilic bilirubin level.
- **Low pH :** Respiratory acidosis, sepsis, hypoxia,seizures.
- Vascular injury in the BBB can precipitate cross over.
- **Preterm delivery:** Immature BBB.
- **Certain drugs:** Sulphonamides displace the bilirubin from albumin complex.
- **Free Fatty Acid** at high molar ratios of FFA : albumin also displaces bilirubin.

Clinical significance: NNH is very common. But still neurological injury is rare. There is a mismatch between the level of hyperbilirubinemia and the occurrence of its encephalopathy. This variability between bilirubin level and predisposition into encephalopathy is explained by the following factors which increases or influence the entry of bilirubin into the neuronal tissue.

Rate of rise of bilirubin:

It has been postulated that the rate rather than level of hyperbilirubin is major factor which pushes lipophilic bilirubin across the BBB. Hence there is increased risk of kernicterus in hemolytic disease of newborn. Presence of these risk factors can lower the threshold of hyperbilirubinemia causing kernicterus.

Mechanism of bilirubin neurotoxicity:

1. Neuro transmission interruption
2. Mitochondrial dysfunction
3. Membrane impairment of cells
4. Interface with enzyme activity (binding to receptor site)

Histopathology:

There is characteristic neuronal necrosis and yellow staining of bilirubin in

> basal ganglia (globus pallidum)

- Hippocampal cortex
- Subthalamic nuclei
- cerebellum
- Anterior horn cells

There is sparing of cerebral cortex.

Extra CNS lesions are seen such as

- Renal tubular necrosis
- Intestinal mucosal desposits
- Pancreatic deposits

BIND (Bilirubin Induced Neurological Delay) can be

- acute

- chronic

Acute Bilirubin encephalopathy:

Severe hyperbilirubinemia of serum bilirubin >20mg/dl can develop signs of acute bilirubin encephalopathy. If undiagnosed may end in kernicterus. Manifest clinically as three phases based on its progression and evolution. Due to the affliction of hippocampal, midbrains

and cerebellar areas, symptoms are also predominant based on tone and reflex (clinical significance). Mortality and morbidity increases with each progressing phase.

Phase I (1st 1-2 days)

- Hypotonia,
- poor suck,
- lethargy (excessive sleepness)
- absence of startle reflex
- weakness

Phase II (middle of 1st wk)

- irritability,
- Hypertonia of extensor muscles (opisthotonus, occulogyric crises, rigidity and retrocollis)
- fever & seizures

Mortality in this phase is very high and those babies who survive this phase progress on to chronic encephalopathy (Kernicterus).

Phase III (after the first wk)

- Opisthotonus,
- high pitched cry,
- apnoea ,
- seizures,
- coma and death.

Chronic bilirubin encephalopathy (Kernicterus)-

Usually evident by 3 years of age. The term Kernicterus in the clinical scenario should be used to denote the chronic and permanent sequalae of bilirubin toxicity. Clinical features are athetosis, sensorineural deafness, limitation of upward gaze, dental dysplasia, sometimes intellectual deficit.

Prevention of toxicity:

The prevention of bilirubin toxicity is remarkably correlated to the etiology and factors affecting bilirubin cross over. The rate of bilirubin production is to be brought down. Immunoglobulin in isoimmune HDN, discontinuation of sulphonamide like drugs, increased feeding, increased calorie to reduce enterohepatic circulation of bilirubin, prevention of pH, hypoxia and acidosis.

Management of hyperbilirubinemia includes identification of at risk neonates, identification of the cause, deciding when to start & stop treatment and watch for severe hyperbilirubinemia, also decides the time of discharge

Removal of excess bilirubin: -

>Phototherapy,

>Exchange transfusion

Historical therapies:

Phenobarbitone -- increases conjugation

Oral agar -- reduces enterohepatic circulation

Metaloprotoporphyrin-- inhibits heme oxygenase

As per AAP recommendation, jaundice within 24hrs of life in healthy term newborn is always pathological. Newborn's risk of developing significant hyperbilirubinemia classified as low, intermediate or high, depending on the rate of rise of bilirubin level, as shown in the bilirubin chart above. Conjugated hyperbilirubinemia is always pathological. But there is no direct toxicity due to increased conjugated bilirubin level to the brain cells. In term baby with hemolysis, a bilirubin level above 20mg/dl (342µmol/L) is of concern.

Fig : 6-a BILIRUBIN STAINING IN THE MID BRAIN

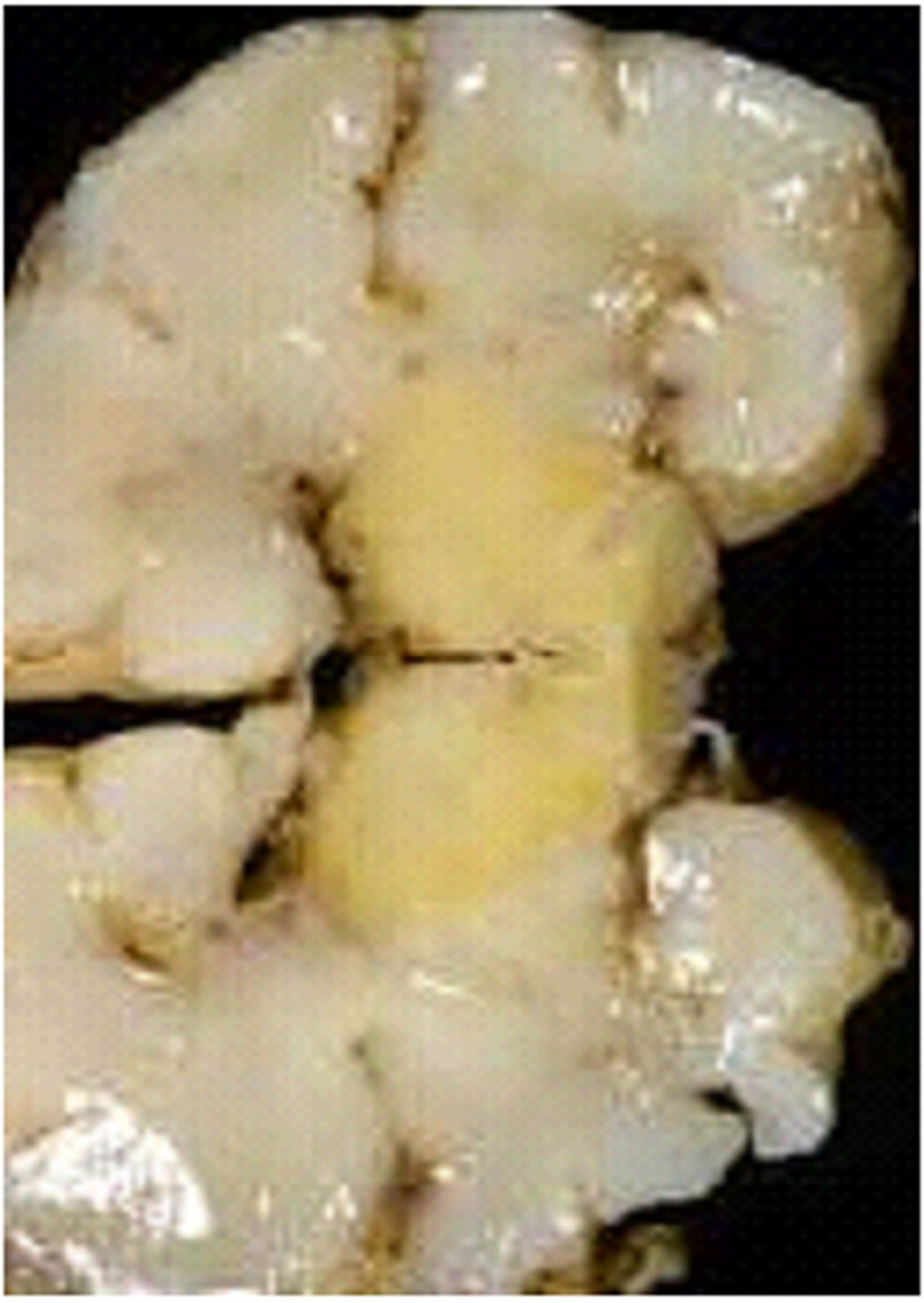


Fig : 6-b BILIRUBIN GROSS HPE DEPOSITS IN GLOBUS PALLIDUS

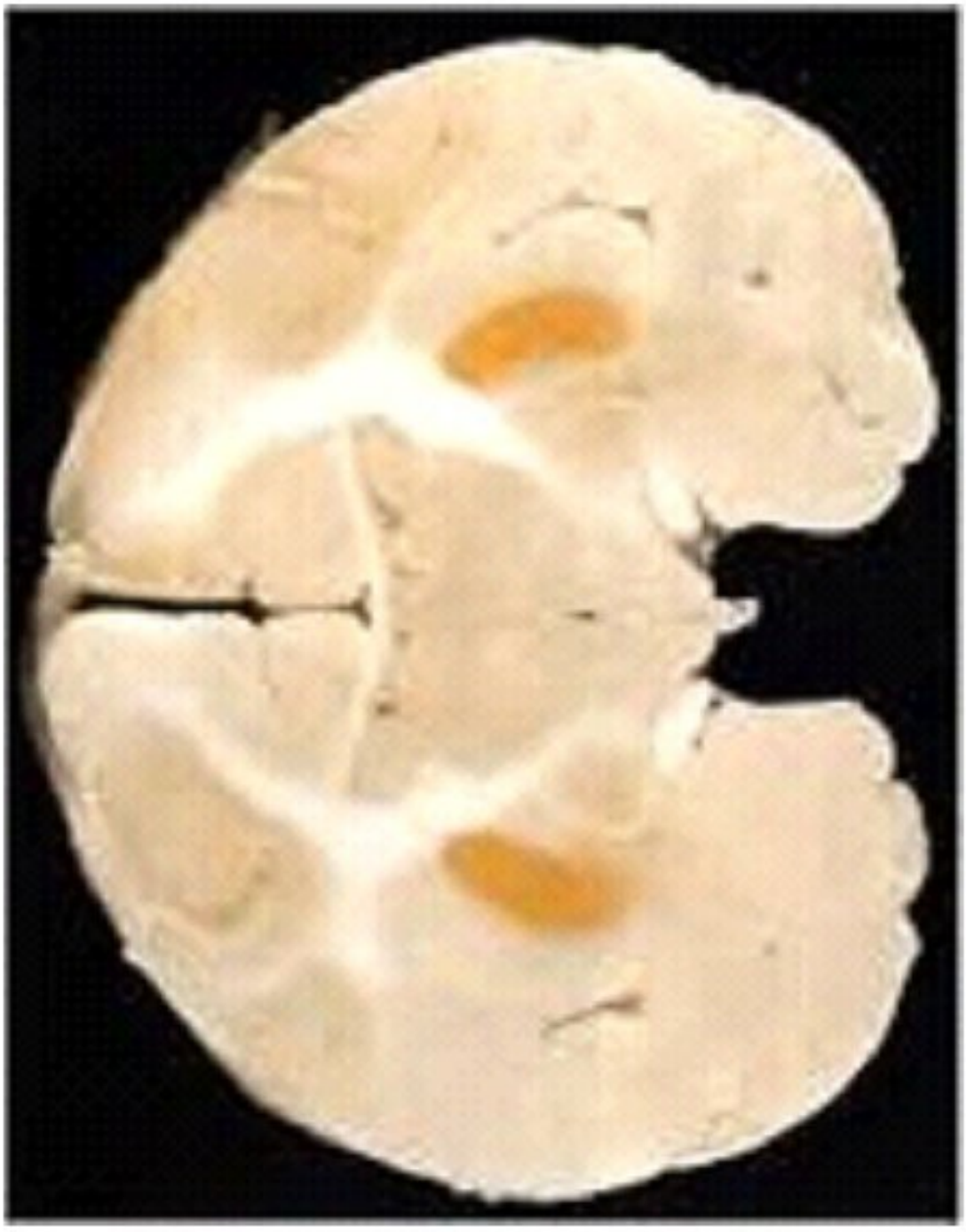


Fig : 7 HOUR SPECIFIC BILIRUBIN NOMOGRAM

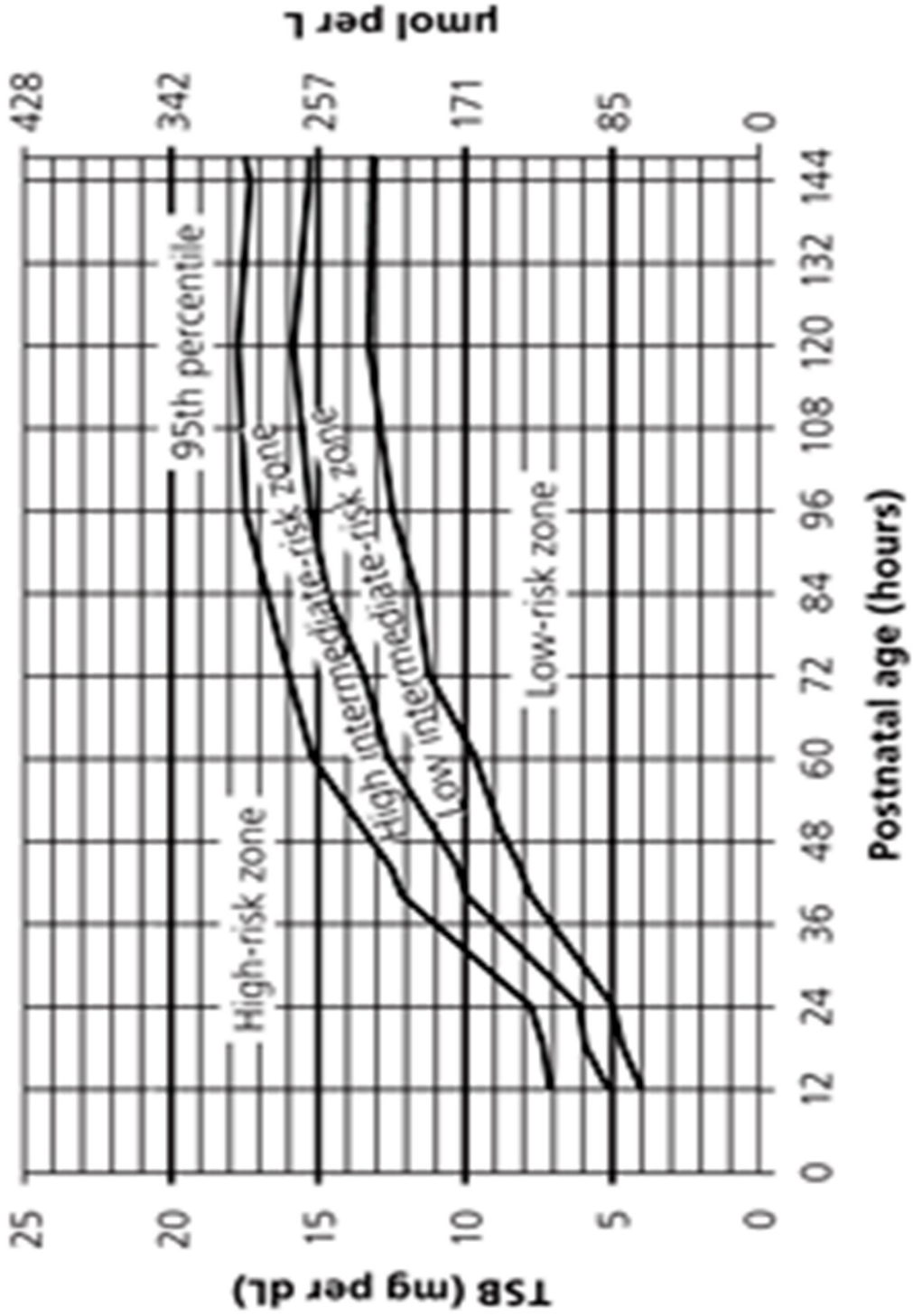
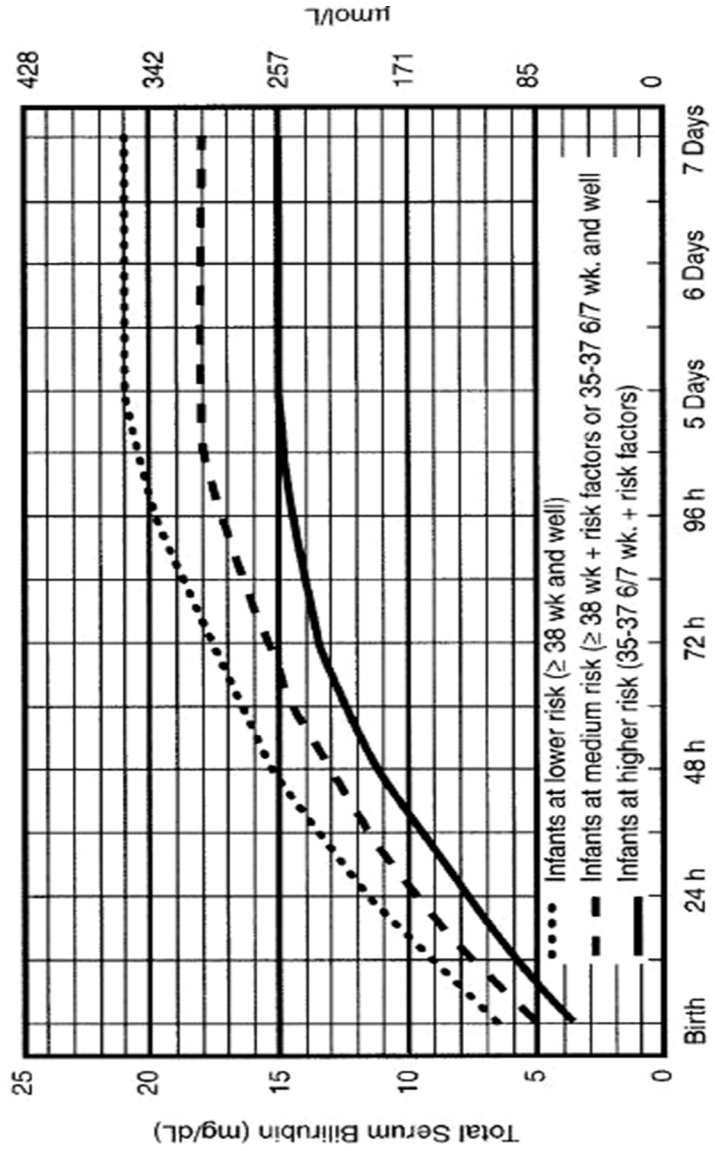


FIG : 8 AAP GUIDELINES FOR PHOTOTHERAPY IN NEONATES WITH 35 OR MORE WEEKS OF GESTATIONAL AGE



- Use total bilirubin. Do not subtract direct reacting or conjugated bilirubin.
- Risk factors = isoimmune hemolytic disease, G6PD deficiency, asphyxia, significant lethargy, temperature instability, sepsis, acidosis, or albumin < 3.0g/dL (if measured)
- For well infants 35-37 6/7 wk can adjust TSB levels for intervention around the medium risk line. It is an option to intervene at lower TSB levels for infants closer to 35 wks and at higher TSB levels for those closer to 37 6/7 wk.
- It is an option to provide conventional phototherapy in hospital or at home at TSB levels 2-3 mg/dL (35-50mmol/L) below those shown but home phototherapy should not be used in any infant with risk factors.

Management :

Investigations:

Identifying the cause of NNH is vital in the treatment of these neonates. The following basic tests are done to classify and treat the NNH accordingly.

1. Maternal blood group
2. Baby blood group
3. Cord bilirubin and venous bilirubin levels
4. Hemoglobin/ CBC
5. Peripheral smear and reticulocyte count
6. Coomb's Test

These tests are fairly conclusive in diagnosing the cause of the child's NNH.

FIG : 9 DIAGNOSTIC WORK UP OF NEONATAL HYPERBILIRUBINEMIA

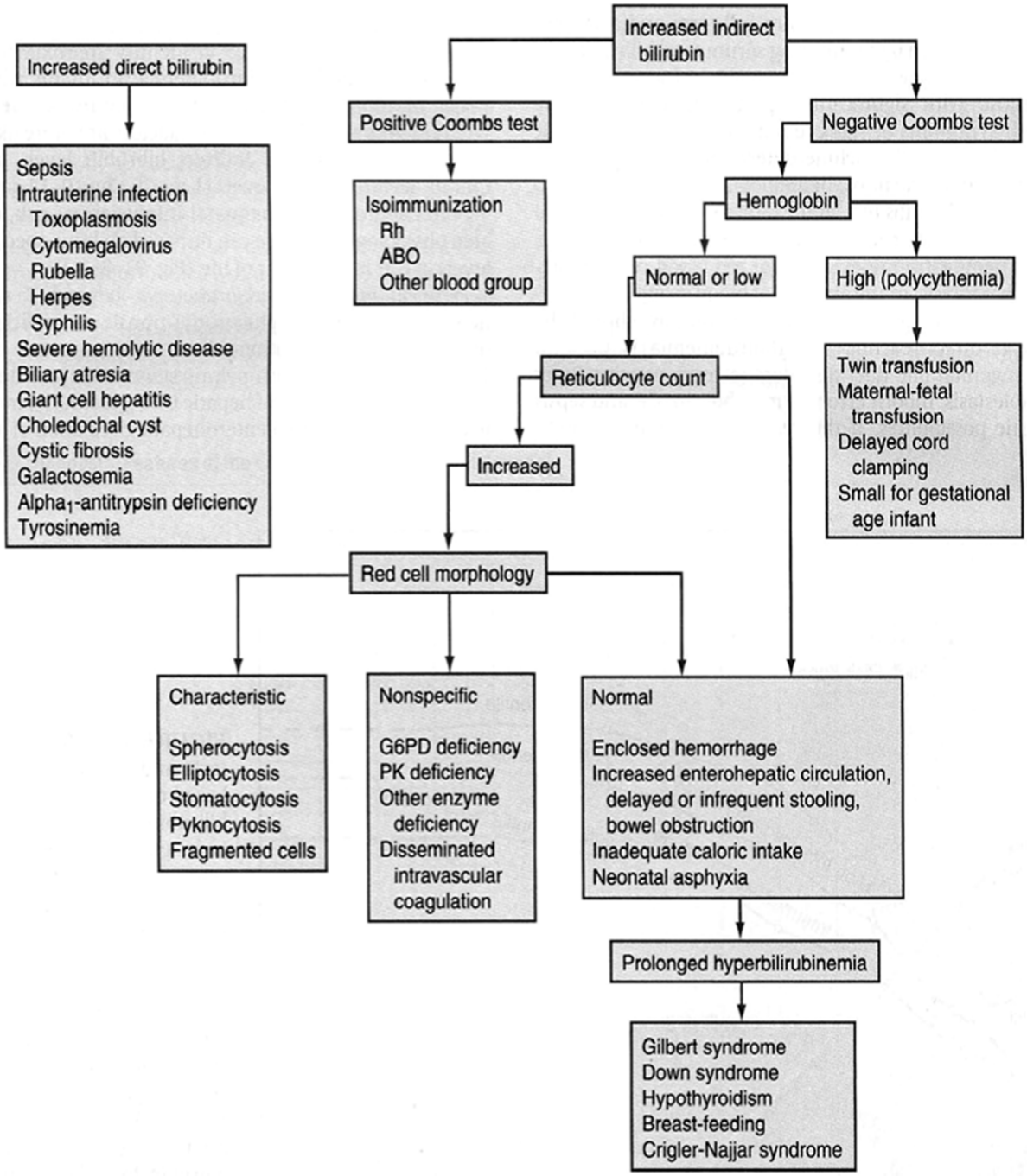
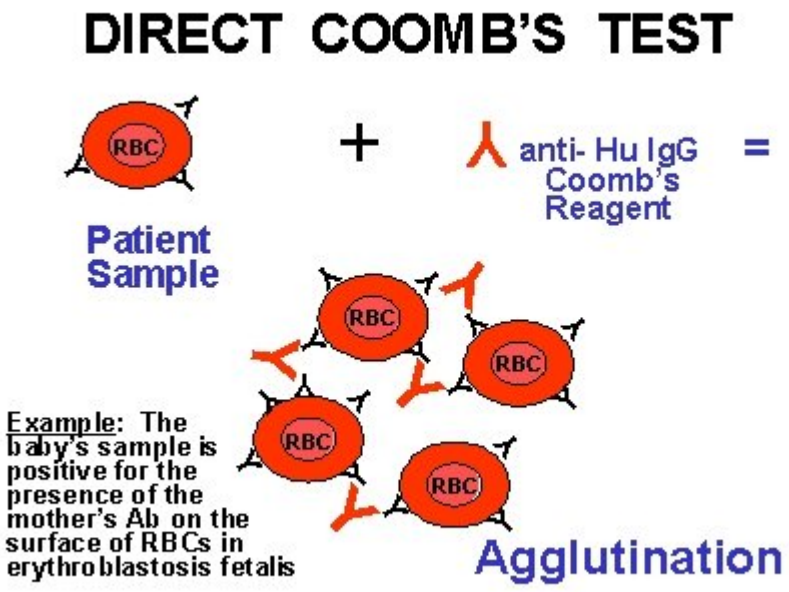


FIG : 10 DIRECT COOMBS TEST



In the direct antiglobulin test(direct coombs test) , antibodies of Ig G type is elicited on the washed RBCs of babies. Often this is weakly positive DCT. Alloantibodies anti-A or anti-B can be eluted from the RBCs of the baby. The presence of free anti A and anti –B allobodies in the baby's serum can be assessed by indirect antiglobulin test. In clinically significant A-O or B-O incompatibility, nearly all the babies have this test positive. More spherocytes & stonger antiglobulin reaction are seen in those babies with jaundice requiring phototherapy or exchange transfusion. Many of the ABO incompatibile babies do not require therapy, except those with hyperbilirubinemia

PERIPHERAL SMEAR STUDY:

Anemia is usually absent or mild. In majority, babies exhibit an increased numbers of nucleated RBCs and increased reticulocyte count (5- 15 %) in the peripheral smear. Partial membrane loss results in microspherocytes which are charecteristics on the peripheral smear. Spherocytes are dense , staining spherical red cells with normal or slightly decreased MCV without any central pallor

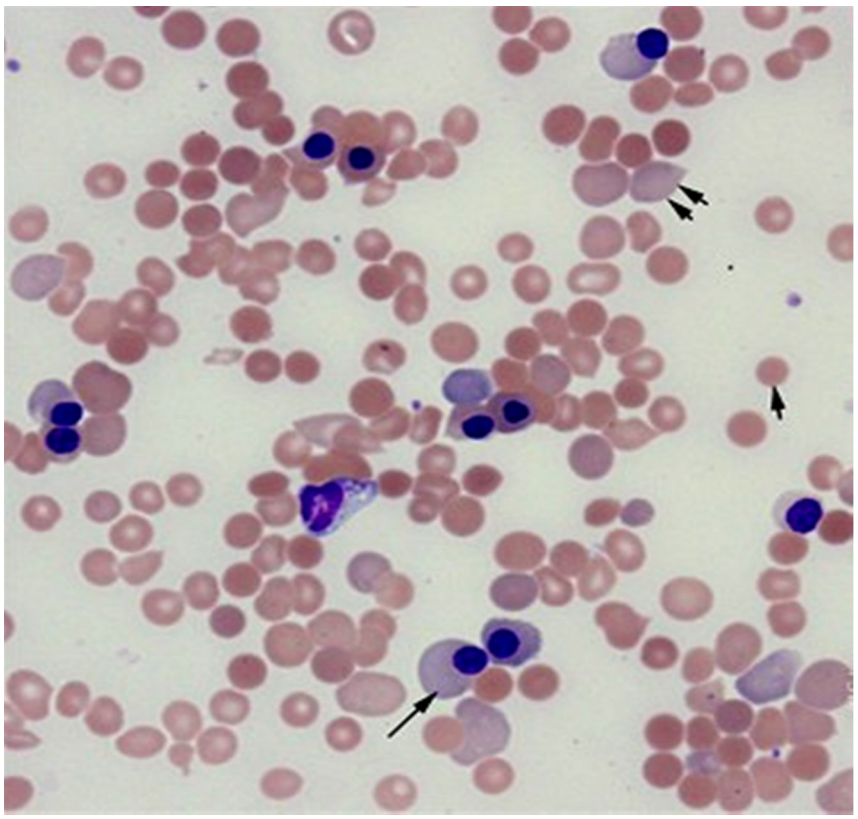


FIG 11

- Long arrow- reticulocyte premature RBC
- Short arrow- spherocyte RBC
- Double arrow- polychromatophilic RBC

Phototherapy:

The most efficient are the blue lamps with peak output at 425 – 475 nm which is the maximum absorption peak of bilirubin. Due to the skin texture, fiberoptic phototherapy (phototherapy blankets) reduce bilirubin level relatively less in term babies. Phototherapy is initiated based on age of the neonate & the total serum bilirubin level. The power output of the light (irradiance) is directly related to the distance between the lights & the neonate.

Photo isomerization:

Photo isomerisation happens at low dose phototherapy (6 microwatts/sq.cm /nm). Natural isomer of unconjugated bilirubin is converted to polar isomer which is less toxic and without conjugation excereted in to the bile. If baby is not passing stools, photo isomer is changed back to unconjugated bilirubin and gut reabsorbs it after 12 hours of phototherapy, photo isomers constitute 20% of total bilirubins.

Structural isomerisation:

Irreversibly converted to lumirubin by cyclization. Also excreted without conjugation into bile, rapidly. During phototherapy 2% to 6% of serum bilirubin is lumirubin. At a dose of 6 - 12 µwatts/sqcm/nm, this is the significant way of lowering serum bilirubin levels.

Photo oxidation:

Photo oxidation is a slow process that converts bilirubin to polar products

Technique of phototherapy:

Effect of phototherapy depends on irradiance, distance from the infant (inversely related) light spectrum and extent of skin area exposure.

Conventional phototherapy when kept at 45 cm above the baby, at 8 – 10 µwatts/sq.cm/nm , at 430 to 490 nm deliver the irradiance of optimal spectrum. Lactation is continued , no additional fluid is needed.

Intensive phototherapy provides 30µwatt/sq.cm/nm at the same spectrum and is indicated in:

1. rapid rise of the serum bilirubin level
2. the serum bilirubin level is within 50µmol/L (which may need exchange transfusion after 72 hours)
3. single phototherapy fail to respond (even after 6 hours of starting phototherapy, rise or absence of falling trend of serum bilirubin)

FIG : 12 PHOTOTHERAPY UNIT

FIG : 13 DURING PHOTOTHERAPY

General care:

1) Maximum area of exposure
2) Supine portion in thermo neutral environment
3) Eye protection (Eye covers)
    - Hydration to be monitored
    - Turn the neonates every 2 hours
    - 5 – 8 cm space between it and the incubator if used
    - 10 – 20% extra fluid in addition to usual requirement is to compensate insensible water loss in warmer
    - don't interrupt phototherapy for feeding, continue IV /enteral feeds.

Disadvantages of phototherapy:

- Separation from parents as it is continuous
- Bronze baby syndrome
- Retinal damage, skin rash, burns, loose stools, thermoregulation instability, dehydration

The total serum bilirubin should decline by 1-2 mg/dl (17-34µmol/L) within 4 - 6hrs

Tests in all babies with significant hyperbilirubinemia:

Serum bilirubn, PCV, blood group (mother and baby), coombs test, complete blood count, blood G6PD levels, cultures of blood, Urine & CSF (if meningitis is suspected).

IV Immunoglobulin:

500mg/kg over 4 hours – can be an adjunct to intensive phototherapy in Rh & ABO incompatibility when serum bilirubin rise by > 8.5 µmol/L per hour continuously.

Causes for prolonged jaundice:

- Break milk jaundice
- Hypothyroidism
- Galactosemia
- Hepatitis

Failure of phototherapy: Failure to reduce bilirubin of 1 – 2 mg/dl after 4 – 6 hours of phototherapy and/or to maintain the bilirubin lelvel below exchange transfusion.

Exchange transfusion:

For ABO isoimmunisation, fresh whole blood of mother's blood group & baby Rh group is used. For Rh isoimmunisation, fresh whole blood of baby blood group & mother Rh group is used . Baby's blood group is used in other situations.

Exchange transfusion removes RBCs coated with antibodies, unattached antibodies removal of hemolysed RBCs , donor RBCs that lack sensitizing antigens are transfused. Extravascular bilirubin equilibrates rapidly following the removal of bilirubin from the plasma bilirubin level reaches 60% of pre exchange level, within half an hour. Rapid transfer of bilirubin into vascular bed. The post exchange bilirubin level if increased is due to

- Lysis of senescent donor RBCs
- Hemolysis of antibody coated RBC sequestered in bone marrow or spleen

- From early labelled bilirubin

Indications of exchange transfusion :

- hydropic newborn babies with hemolytic disease –correction of anaemia & to improve heart failure
- Cord Blood Bilirubin > 4.5/dl & HB < 11g/dl
- Rate of rise of bilirubin>1mg/dl/hr, even on phototherapy
- Hemoglobin level is between 11 & 13 mg/dl
- Bilirubin level >0.5mg/dl/hour

Complications of exchange transfusion:

- Vasospasm
- Infection
- Embolism
- Infarction
- Death

METHODOLOGY

METHODOLOGY

SOURCE OF DATA:

All healthy term neonates admitted in the NICU of Government Mohan Kumaramangalam Medical college and Hospital were screened for ABO incompatibility and included based on the following criteria.

STUDY DESIGN

Type of study : Prospective Observational Cohort Study

Period of study : One Yr from September 2014 to August 2015

Total newborn screened : 6200 babies

Study population : 820 full term healthy newborn babies born to O group mothers delivered in GMKMCH, Salem

Inclusion criteria:

- Healthy term babies delivered within the period of study
- Born to mothers with O positive blood group
- Appropriate for age
- Small for gestational age

Exclusion criteria:

- Rh incompatibility
- Significant illness requiring NICU admission
- Major congenital malformation
- Those who didn't give consent

METHOD OF COLLECTION OF DATA :

3 ml blood drawn from the mother for blood grouping & typing. After getting consent, routinely 2ml of blood is drawn in a sterile manner from the umbilical cord & veni puncture on subsequent analysis at 24hrs , 48 hrs & 72 hrs of life from those neonates. All these samples were taken with sterile disposable % ml syringes & needle. The test tubes contain ethylene diamine tetra acetic acid (EDTA) & they were taken to the lab immediately.

A predrawn proforma is explained to the mother or the caregiver. Informed consent regarding participation in the study is obtained in the regional language **(Annexure- 1).** All details are filled in the proforma.

Babies are clinically assessed for age , sex, gestational age, birth weight, previous history of jaundice in the family, day of onset of jaundice, pattern of feeding, fever, other neurological symptoms.

Thorough clinical examination of the baby is done to identify:

- pallor,
- temperature
- icterus,
- hepatosplenomegaly,
- extravasation of blood (cephalhematoma / subgaleal bleed)
- excessive bruising,
- neurological signs like opisthotonus

Investigations done:

Blood was collected in sterile 2 ml syringes and sent in sterile test tubes for the biochemical tests. EDTA tubes were used for peripheral smears.

Mother's blood : Blood grouping & Rh typing is done for the mother.

Cord blood : cord blood sample was taken & sent for

- blood grouping & Rh typing and Direct coombs test(DCT)
- cord blood bilirubin level estimation

neonatal venous sample blood is later sent for:

- serum bilirubin level at 24hrs, 48hrs & 72hrs

And if Direct coombs test is positive, sent for

- reticulocyte count,
- peripheral smear study
- complete blood count

Management :

Babies were followed up daily for the progression of icterus & for the intervention. The levels of cord blood bilirubin, 24hrs bilirubin level and the development of neonatal hyperbilirubinemia were correlated and monitored. According to these parameters and also their gestational age, day of life, & presence of risk factors, babies were treated with phototherapy and if necessary with an exchange transfusion.

All these monitored parameters and the respective intervention in each of the neonate was meticulously documented and prepared as a **master chart** for Analysis**.(Annexure – 2)**

OBSERVATION AND RESULTS

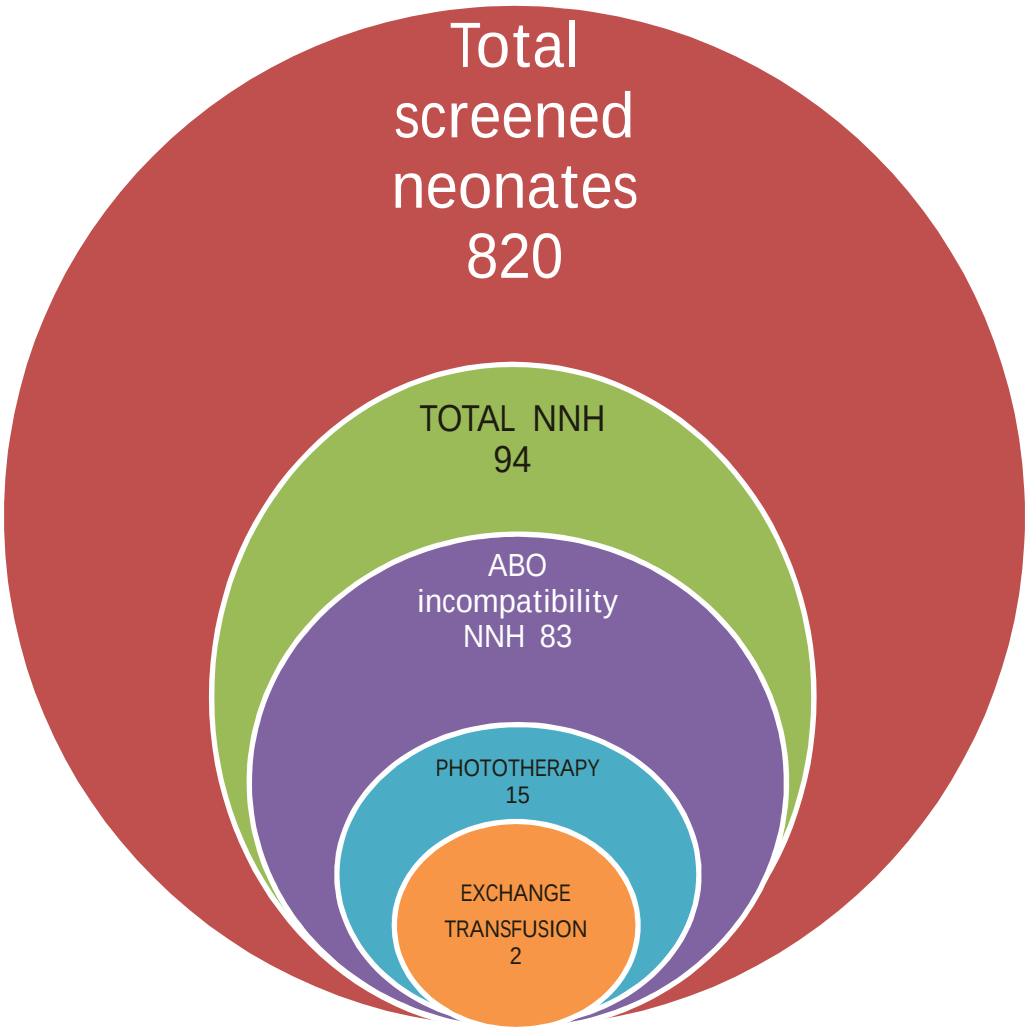
OBSERVATION AND RESULTS

Total number of deliveries during the study period is 6200. Out of these delivered mothers 3286(53%) were O group mothers. Rest of them are A(24%) , B(20%) , AB(3%).Based on our inclusion & exclusion criteria, our cohort study covered a total of 820 healthy term newborns born to O group mothers. There were a total of 94 cases of NNH. 11 cases belonged to the O group. Hence they were taken as the control group in ABO incompatibility.

Analysis of our data was done under the following heads:

Total cohort strength	:	820
Total no of NNH cases	:	94
NNH cases with ABO incompatibility	:	83
Control group- O grp with NNH	:	11
Total no of cases for phototherapy	:	15
Total no of cases with exchange transfusion	:	2

FIG 14 : GRAPHICAL REPRESENTATION OF OUR STUDY DATA



ANALYSIS:

The incidence of NNH due to ABO incompatibility was **10.1 %.**

The no of peripheral smear positive cases (reticulocytes more than 5-6%)) were 9.

The mean reticulocyte count in these smear positive cases was **7.1 %.**

The mean no. of days of phototherapy was **1.6 days**. The time of start of the phototherapy was analysed.

TABLE 1 : SPLIT UP OF NNH CASES.

NNH	No. of babies	%
Positive	94	11.46
Negative	726	88.54
Total	820	100.00

FIG 15 : NNH DISTRIBUTION

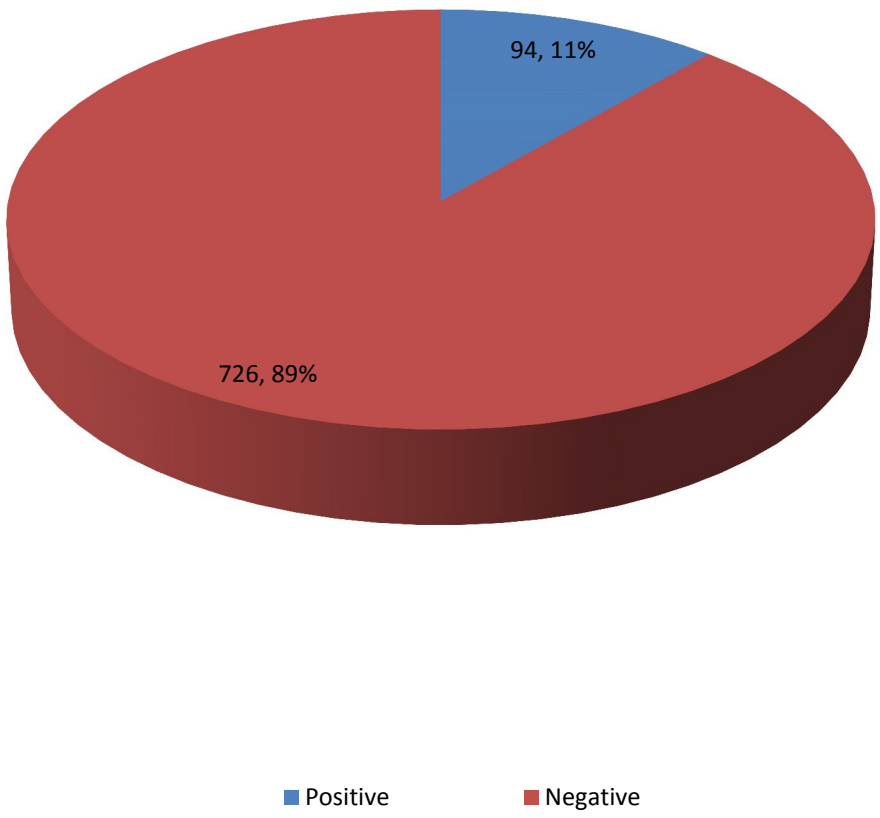


FIG 16: NNH in ABO incompatibility in our study

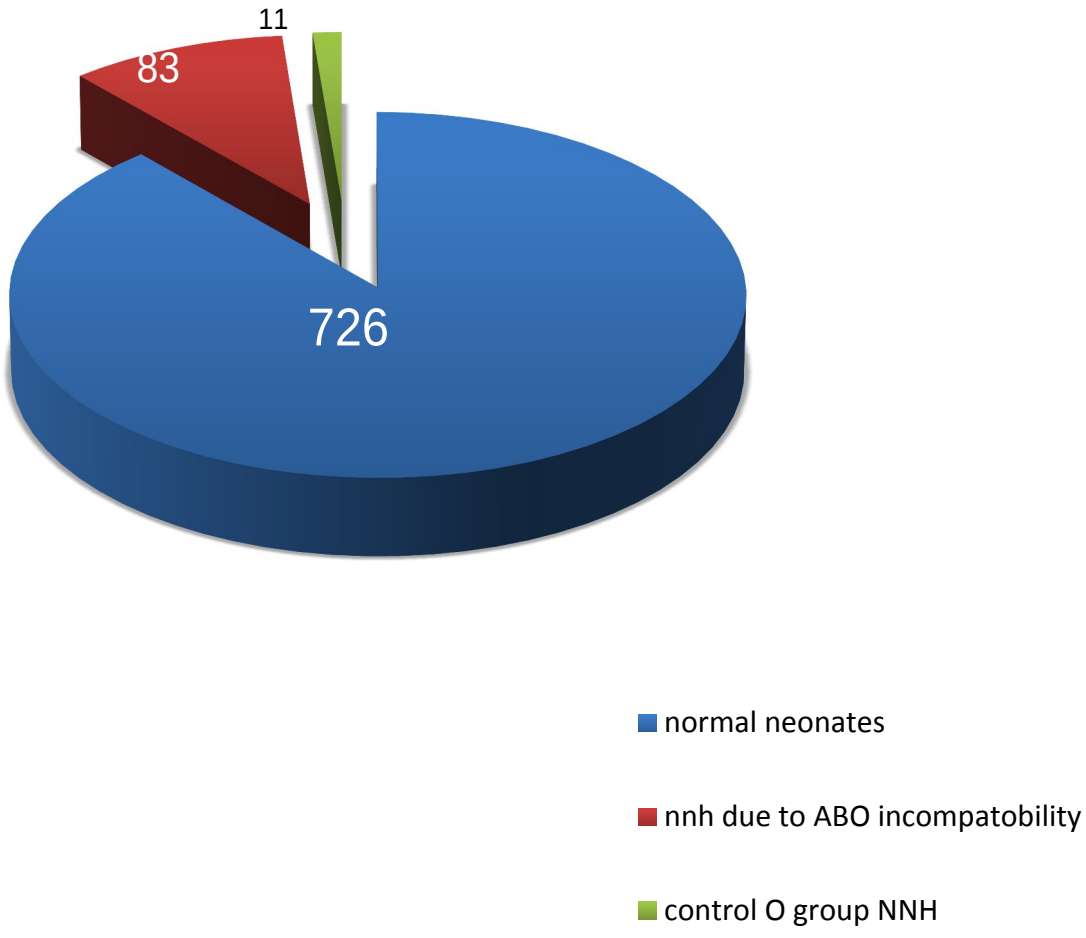


TABLE 2 : SEX AND NNH

Sex	No	Percent
Male	451	55
Female	369	45
Total	820	100

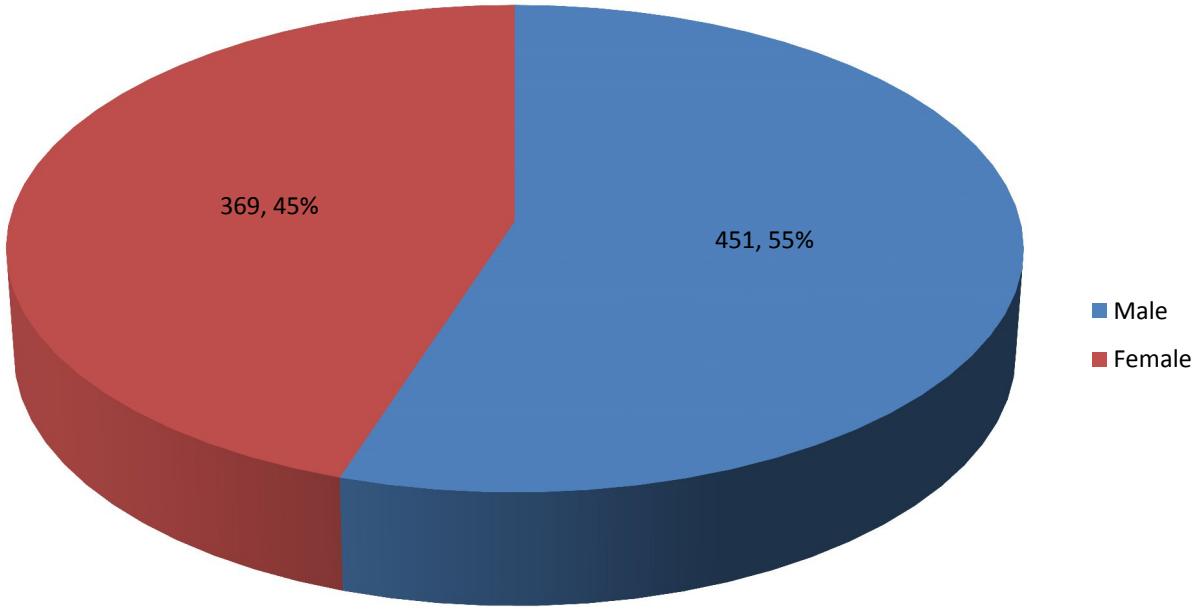


FIG 17 : SEX AND NNH

TABLE 3 : PREVALENCE OF SEX

	NNH +	NNH -	TOTAL		Chi square	P value
Male	52	399	451	11.53%	0.004	0.947
Female	42	327	369	11.32%		

FIG 18 : PREVALENCE OF SEX IN OUR STUDY

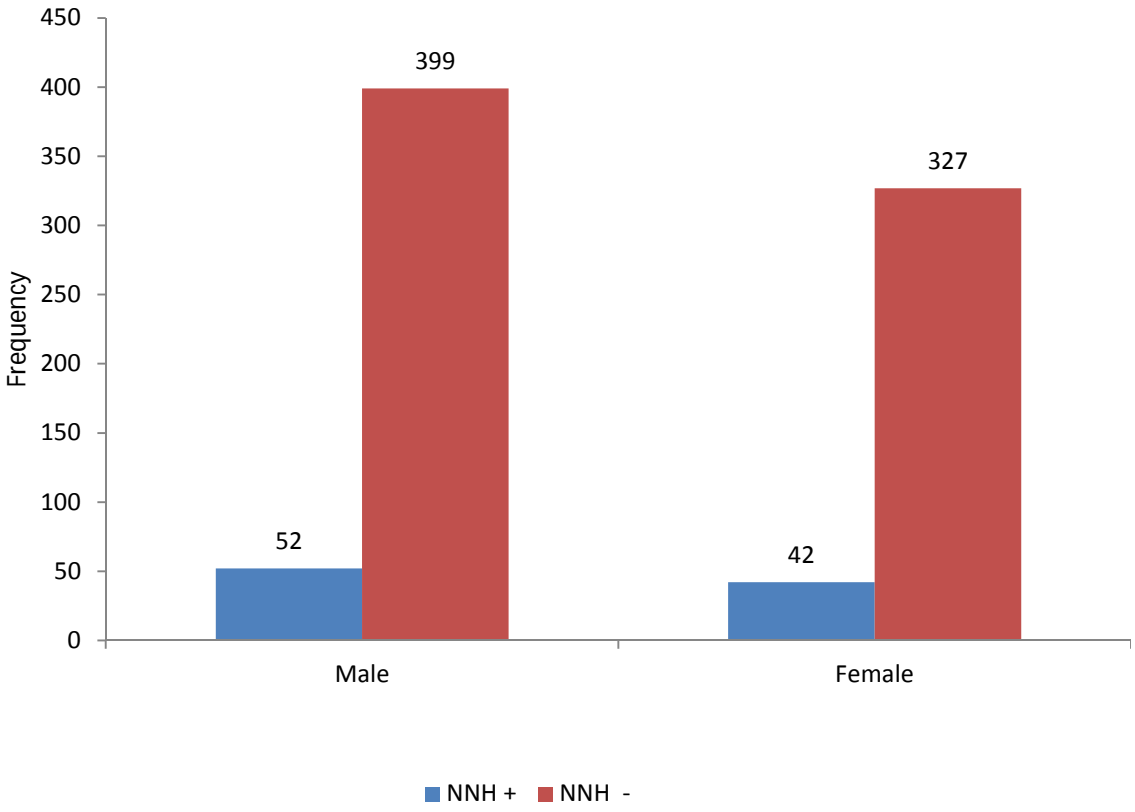


TABLE 4 : CORELATION BETWEEN SEX AND NNH

Sex/NNH In Baby Group	A		B		AB		O		Total NNH	Chi square	P value
	N	%	N	%	N	%	N	%			
Male	26	50	23	44.2	-		3	5.8	52	15.94	0.003**
Female	19	45.24	13	30.95	2	4.76	8	4.76	42		

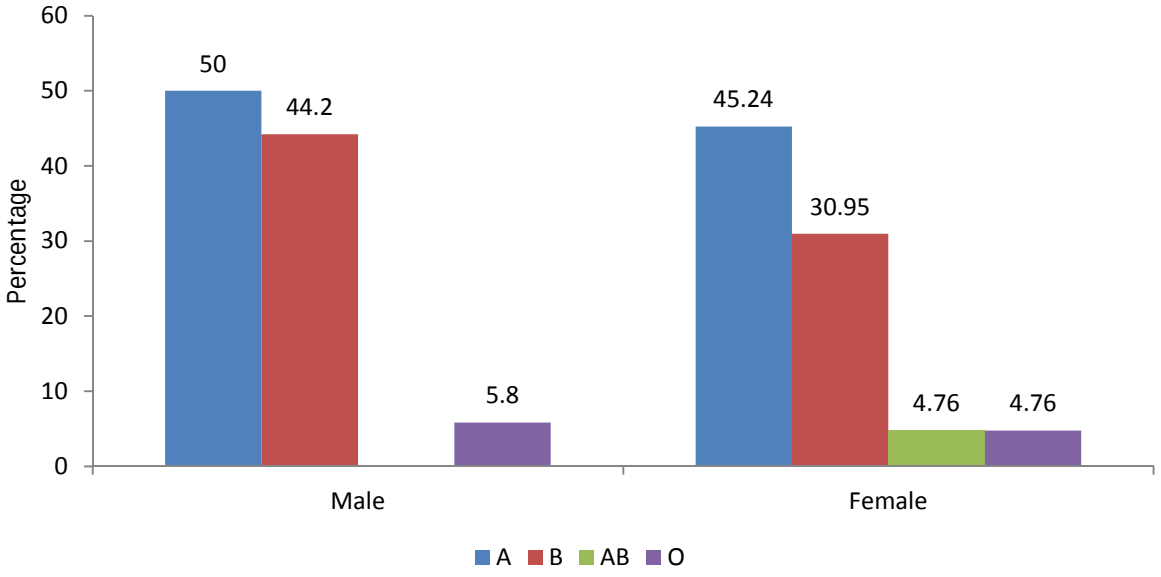


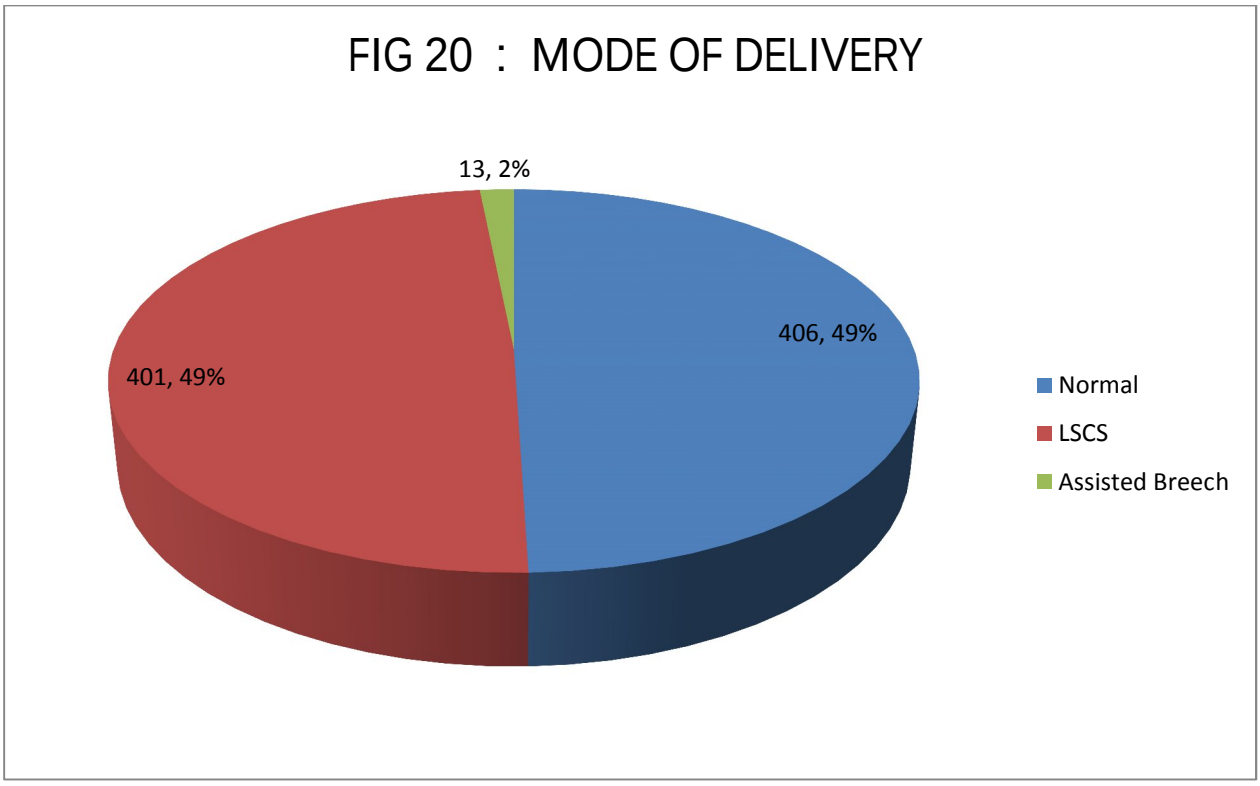
FIG 19 : SEX AND NNH

Out of the 820 babies, there were 451 males & 369 female babies. Out of 451 male babies, 49 developed hyperbilirubinemia, while out of 369 female neonates 45 had hyperbilirubinemia.

This difference in sex ratio was statistically insignificant (p values <0.05). Hence there was no correlation between sex and hyperbilirubinemia.

TABLE 5 : PREVALENCE OF MODE OF DELIVERY

Delivery	No	Percent
Normal	406	49.51
LSCS	401	48.90
Assisted Breech	13	1.59
Total	820	100



Mode of delivery:

Both LSCS and normal vaginal delivery were equally done in our institution

TABLE 6 : MODE OF DELIVERY AND NNH

NNH	Normal		LSCS		Assistedbreech			Chi square	P value
	N	%	N	%	N	%			
Male	25	48.08	24	46.15	3	5.8	52	0.119	0.942
Female	19	45.24	20	47.62	3	7.14	42		

FIG 21 : MODE OF DELIVERY AND NNH

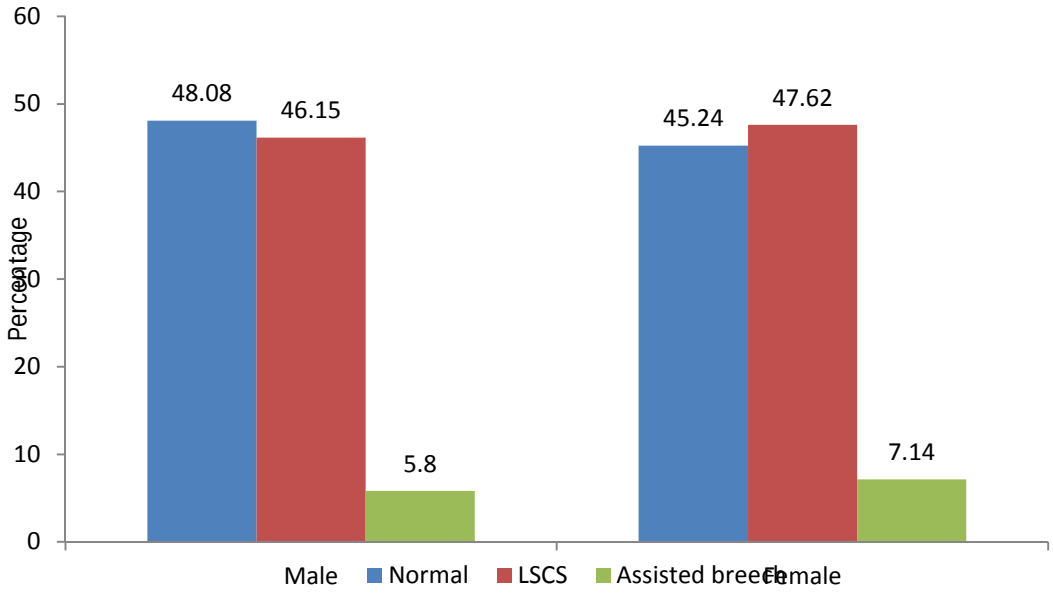


TABLE 7 : BIRTH WEIGHT AND NNH

Incidence of NNH in different birth weight groups was analysed.

Birth weight	No	Percent
< 2.5	77	9.39
2.5 - 2.8	424	51.71
2.9 - 3.2	296	36.10
> 3.2	23	2.80
Total	820	100.00

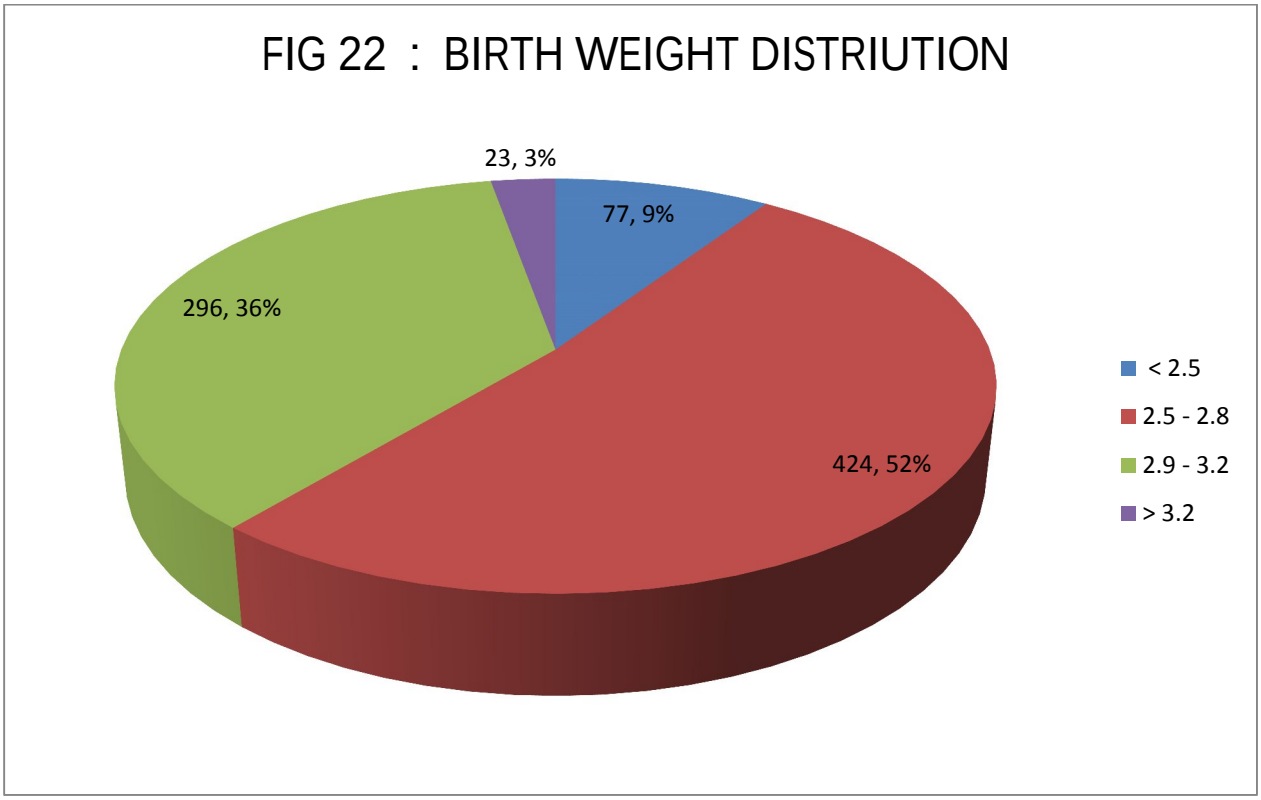


TABLE 8 : STATISTICAL ANALYSIS OF NNH IN BIRTH WEIGHT GROUPS

Birth weight	NNH				Total	Chi square	P
	Positive		Negative				
	N	%	N	%			
< 2.5	14	18.18	63	81.82	77	3.88	0.275
2.5 - 2.8	46	10.85	378	89.15	424		
2.9 - 3.2	32	10.81	264	89.19	296		
> 3.2	2	8.70	21	91.30	23		
Total	83	10	737	90	820		

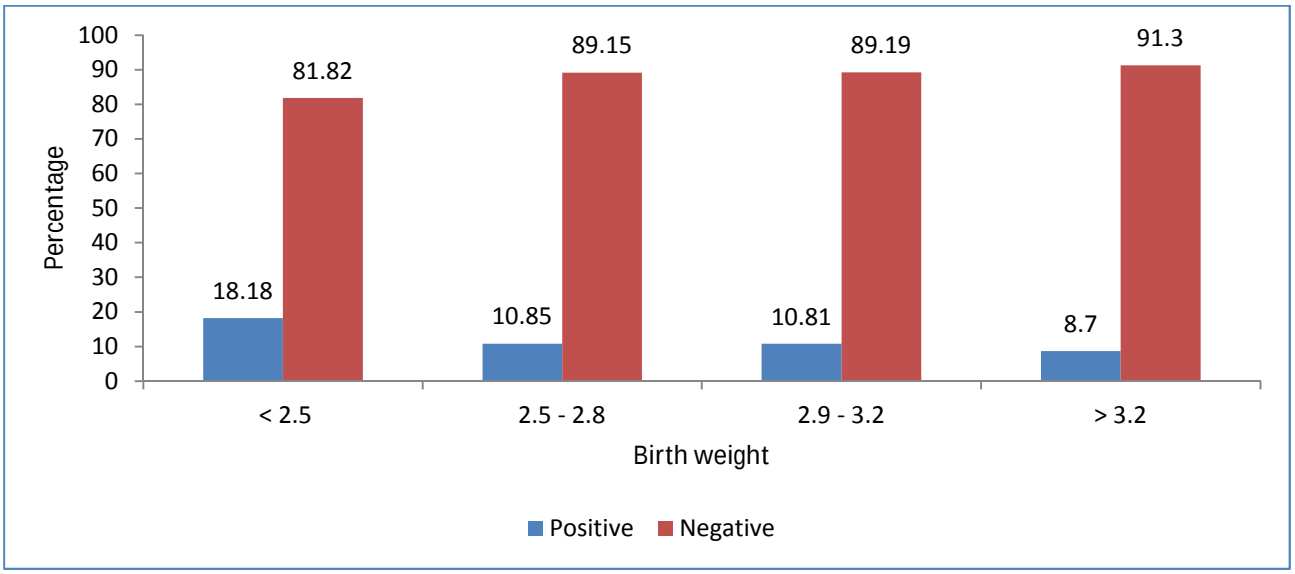
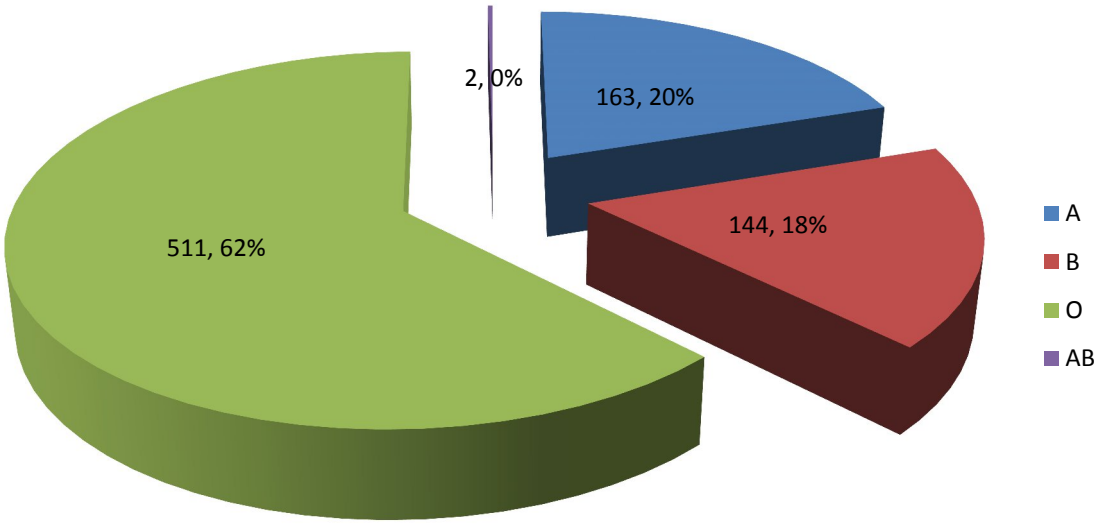


FIG 23 : BIRTH WEIGHT & NNH . Due to the equal incidence of NNH in these weight groups, it is inferred that there is no correlation between birth weight and NNH.

TABLE 9 : BLOOD GROUP PREVALENCE:

Baby GRP	No	Percent
A	163	19.88
B	144	17.56
O	511	62.32
AB	2	0.24
Total	820	100

FIG 24 : PREVALENCE OF BABY GRP



O group was the most prevalent. Babies with NNH in O blood group were taken as the control group in our analysis.

TABLE `10 : BLOOD GROUP AND NNH

Baby GRP	NNH				Total	Chi square	P
	Positive		Negative				
	No	%	No	%			
A	45	27.61	118	72.39	163	115.83	< 0.001**
B	36	25.00	108	75.00	144		
O	11	2.15	500	97.85	511		
AB	2	100.00			2		
Total	94	11.5	726	88.5	820		

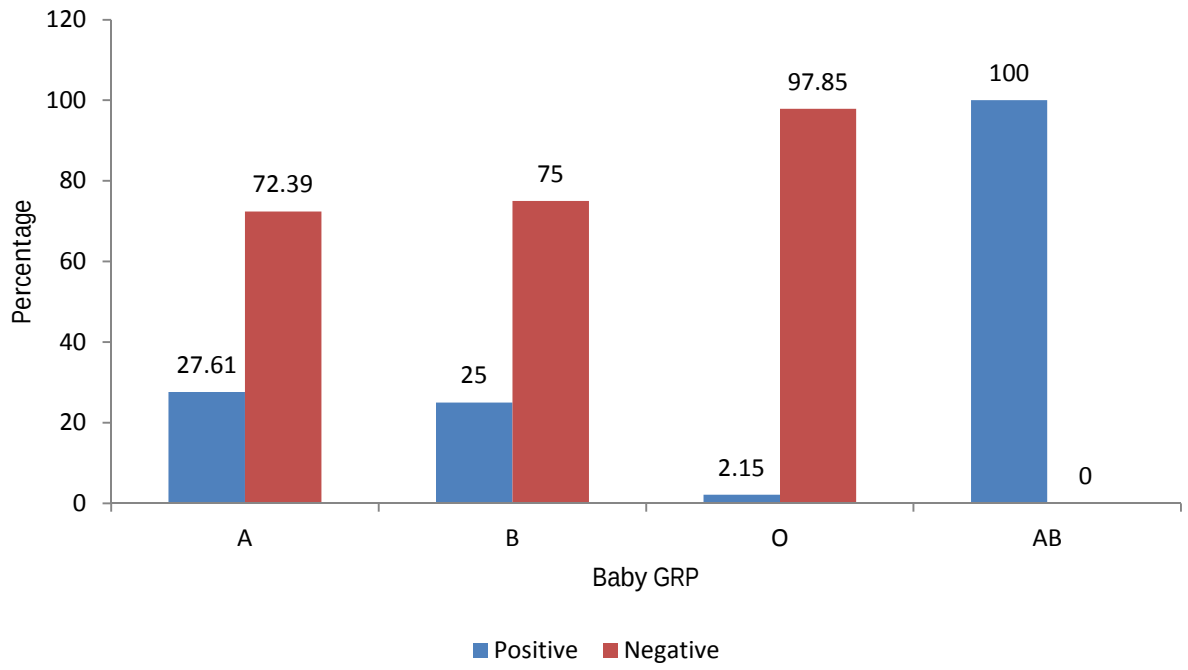
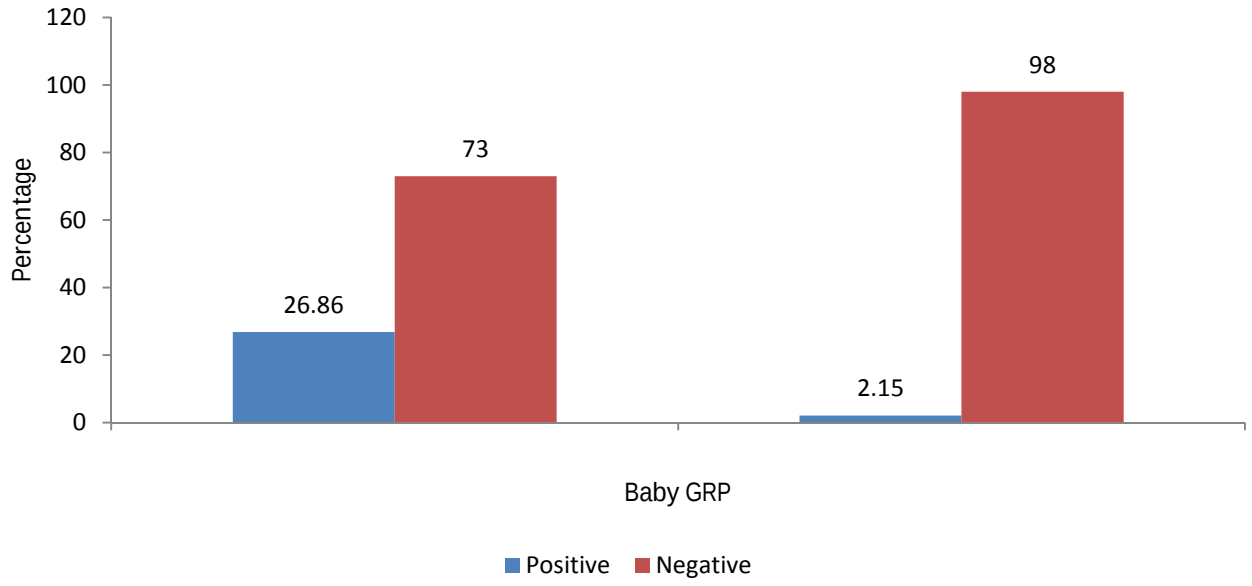


FIG 25: BLOOD GROUP AND NNH

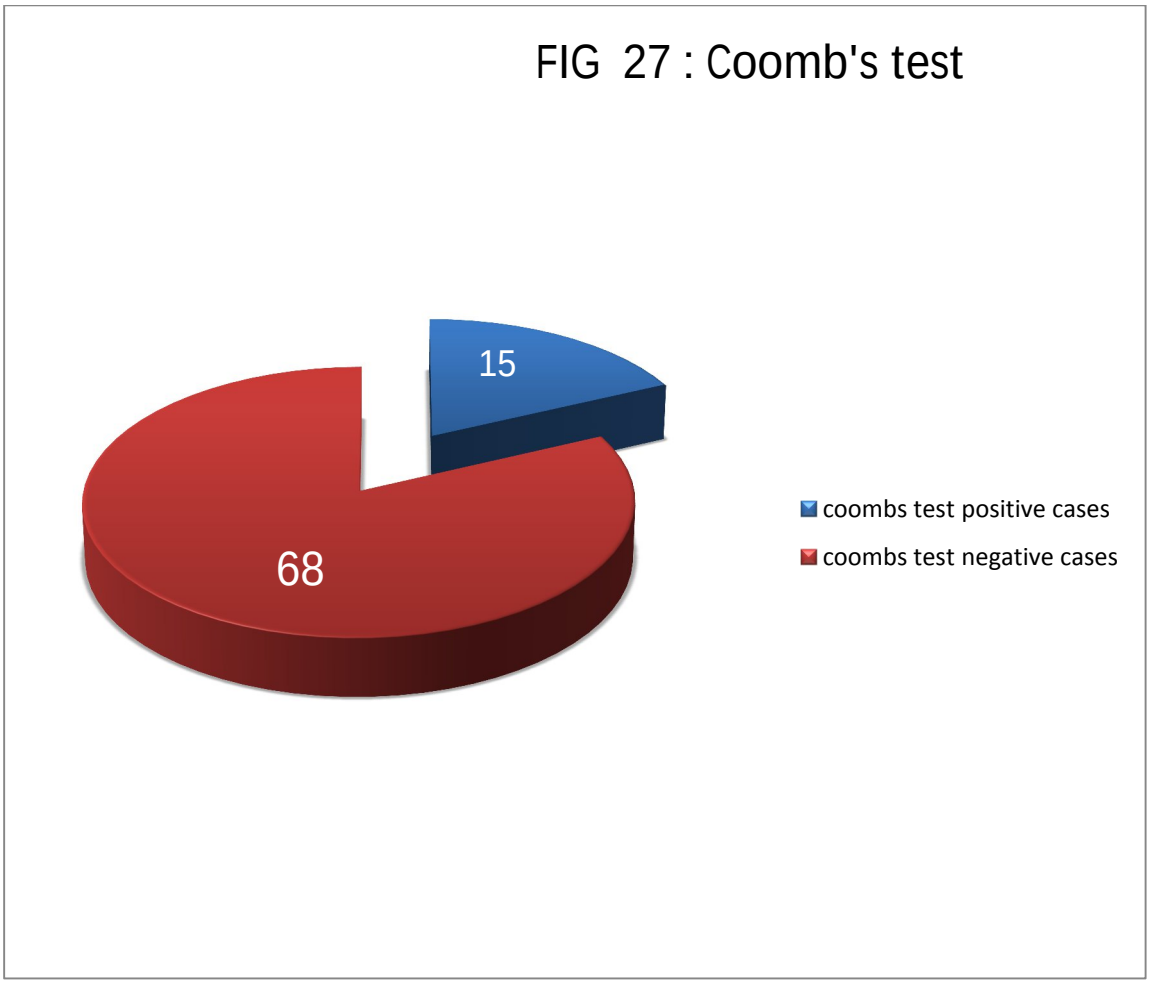
TABLE 11: STRENGTH OF CORELATION BETWEEN BLOOD GROUP & NNH

Baby GRP	NNH				Total	Chi square	P
	Positive		Negative				
	No	%	No	%			
A,B,AB	83	26.86	226	73	309	115.83	< 0.001**
O	11	2.15	500	98	511		
Total	94	11.46	726	89	820		

FIG 26 : CORELATION BETWEEN BLOOD GROUP AND NNH



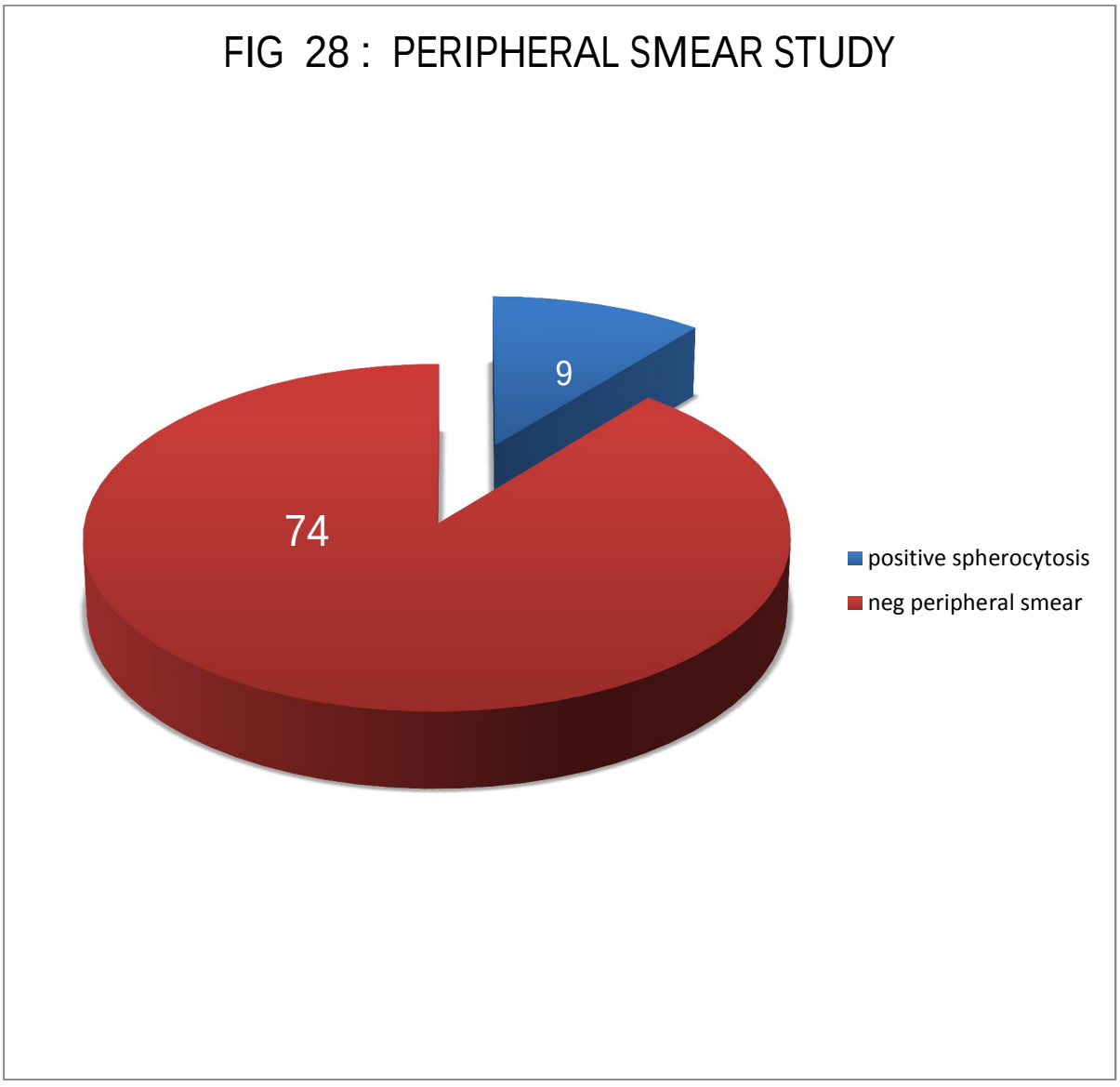
These charts show the significant correlation between NNH in ABO incompatible groups and our control O group babies with less NNH.



The coomb's test was done in all the cases of NNH. There were 15 positive cases. These babies turned out to be those with very high bilirubin levels requiring phototherapy.

ANALYSIS OF PERIPHERAL SMEAR REPORTS.

Those with premature RBCs more than 6% were positive smears



RETICULOCYTE COUNT

Mean reticulocyte count was : 7.1%

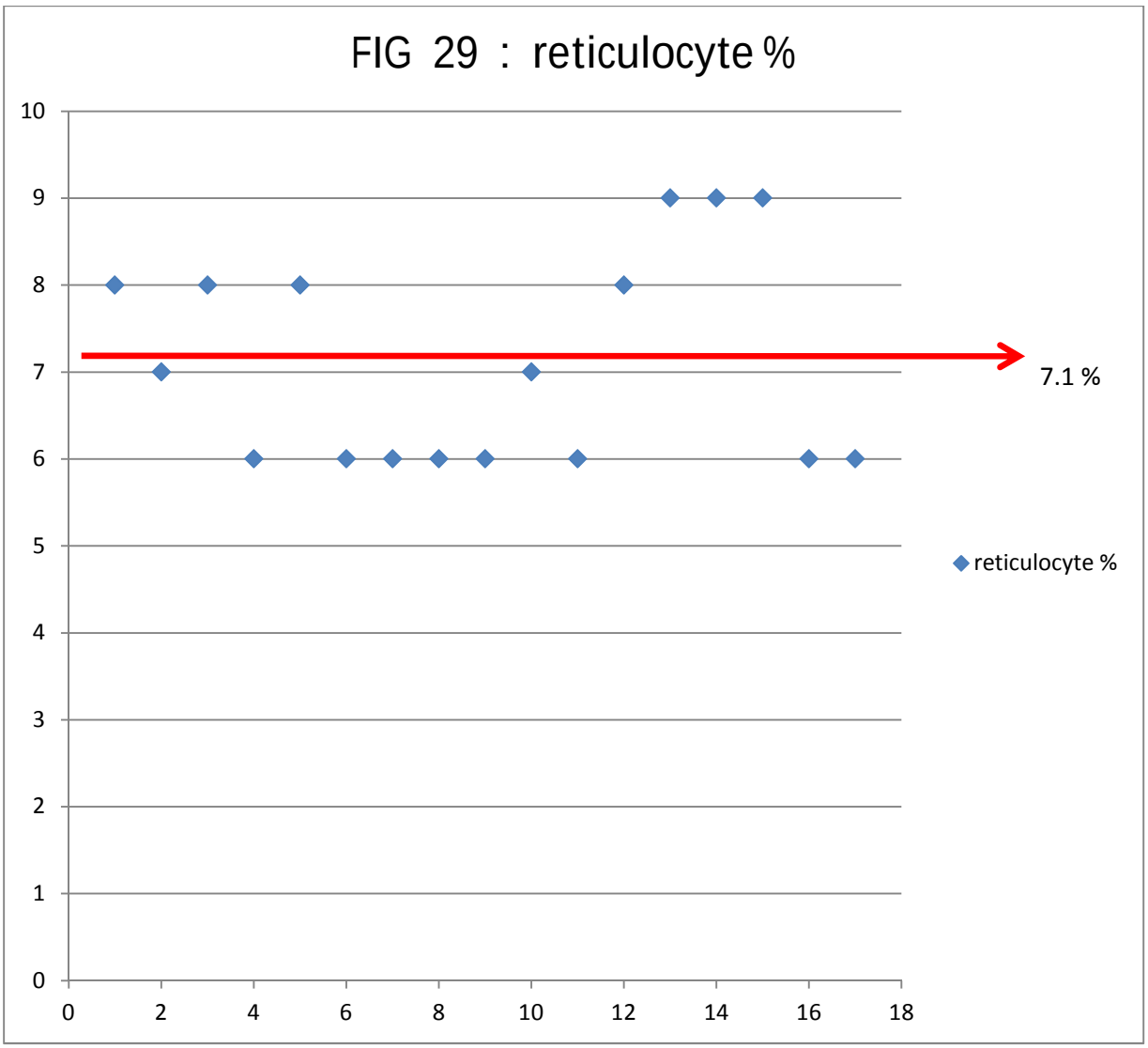


TABLE 12 : TREATMENT OF NNH

TREATMENT MODALITY	Total no.	Total NNH in ABO incompatibile	PERCENTAGE
Phototherapy required	15	83	18.1%
Exchange transfusion	2	83	2.4%

TABLE 13 : PHOTOTHERAPY DETAILS

Phototherapy	**NO.**	**Percent**
Required	15	1.83
Not Required	805	98.17
Total	820	100

TABLE 14: DAY OF INITIATION OF PHOTOTHERAPY

Day phototherapy started	Frequency	Percent	Valid Percent
1	7	0.85	47
2	5	0.61	33
3	3	0.37	20
Total	15	1.83	100
System	805	98.17	
	820	100.00	

TABLE 15 : DAY AND SEX DISTRIBUTION

Day phototherapy started		Sex				Total	
		Male		Female		No	%
		N0	%	N0	%		
	1	4	44.4	3	50.0	7	46.7
	2	3	33.3	2	33.3	5	33.3
	3	2	22.2	1	16.7	3	20.0
Total		9	100.0	6	100.0	15	100.0

FIG 30 : Phototherapy

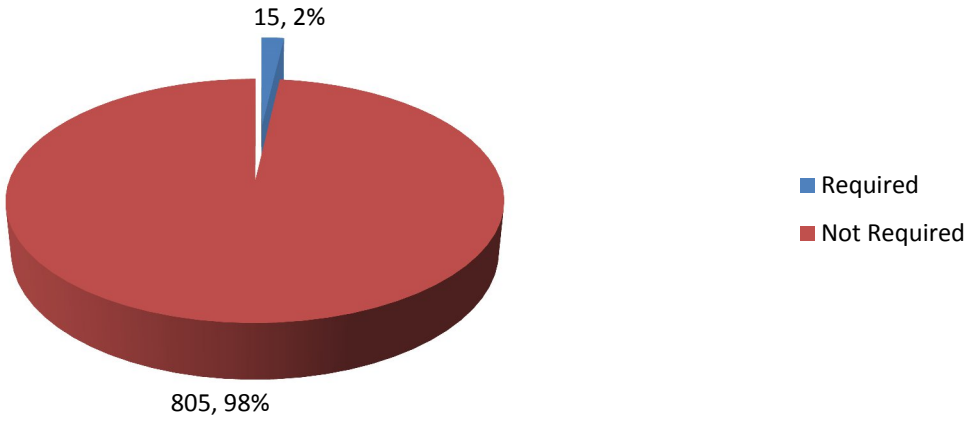


FIG 31 : DAY OF INITIATION OF PHOTOTHERAPY

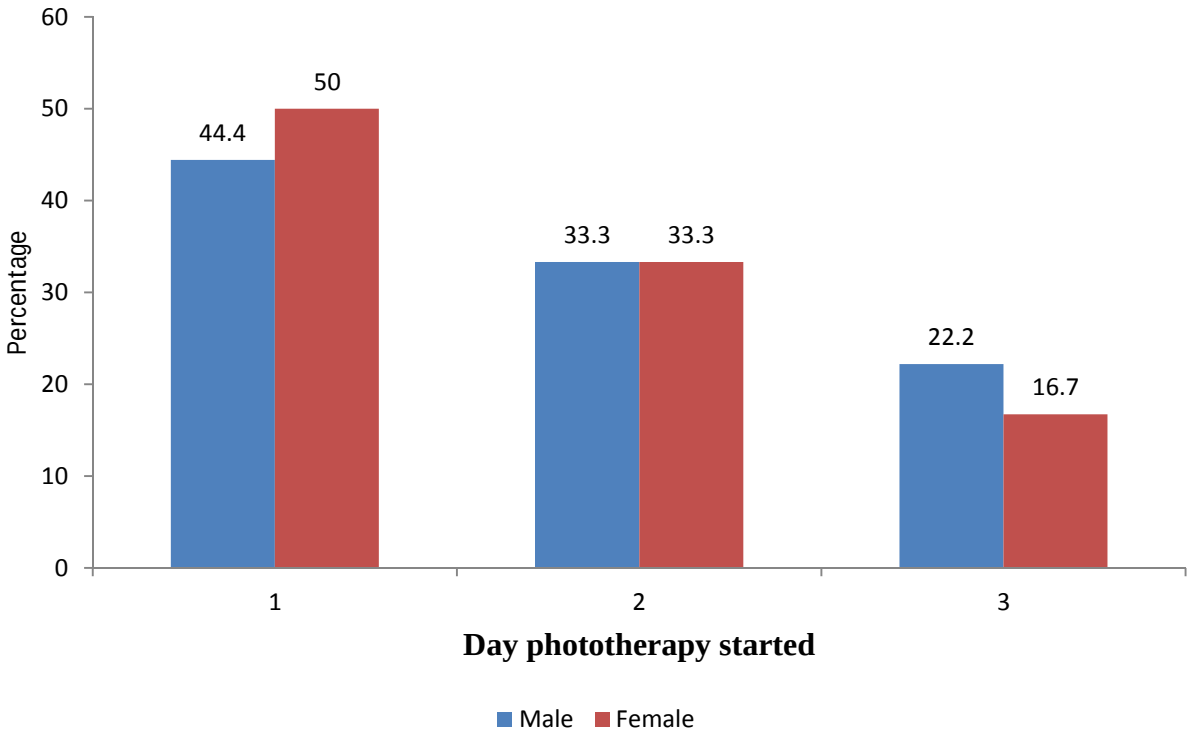
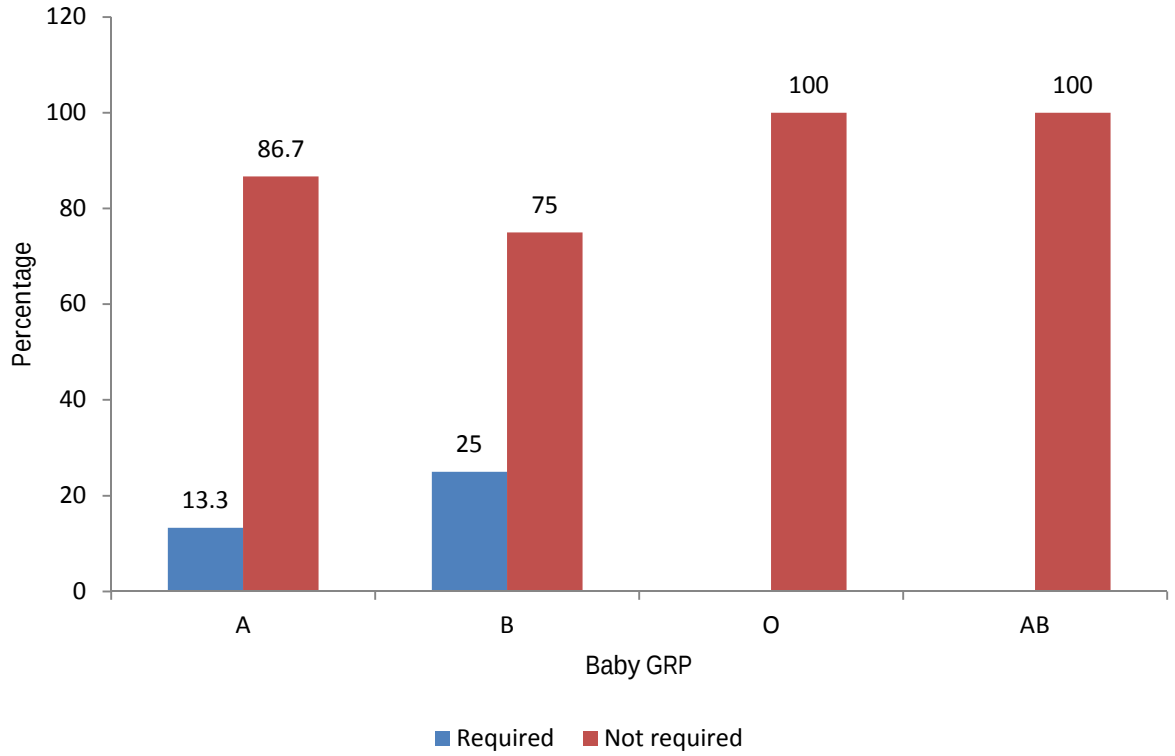


TABLE 16 : BLOOD GROUP AND PHOTOTHERAPY

Baby Group		Phototherapy				Total	
		Required		Not required		No.	
		No.	%	No.	%		
	A	6	13.3	39	86.7	45	
	B	9	25.0	27	75.0	36	
	O			11	100.0	11	
	AB			2	100.0	2	
Total		15	16.0	79	84.0	94	

FIG 32 : BLOOD GROUP AND PHOTOTHERAPY



CORELATION OF THE CORD BLOOD BILIRUBIN AND NNH LEVELS.

For the establishment of the strength of correlation between two variables the following parameters are statistically assessed.

Sensitivity = / (True Positive + False Negative)*100

Specificity = TN/(TN+FP)*100

Positive predictive value = TP / (TP+FP)

Negative Predictive value = TN / (TN+FN)

TABLE 17 : STATISTICAL VALUES

	Test +	Test -	
Diseased	True Positive	False Negative	**Sensitivity**
No diseased	False Positive	True Negative	**Specificity**
	Positive predictive value	**Negative Predictive**	

After calculating these values, each, for

1. Cord Blood Bilirubin and NNH
2. 24 hrs bilirubin and NNH

Cut off values for the same were calculated using the strength of the Negative Predictive Value in **Receiver Operating Curves (ROC).**

FIG 33 : ROC CURVE FOR CORD BLOOD BILIRUBIN

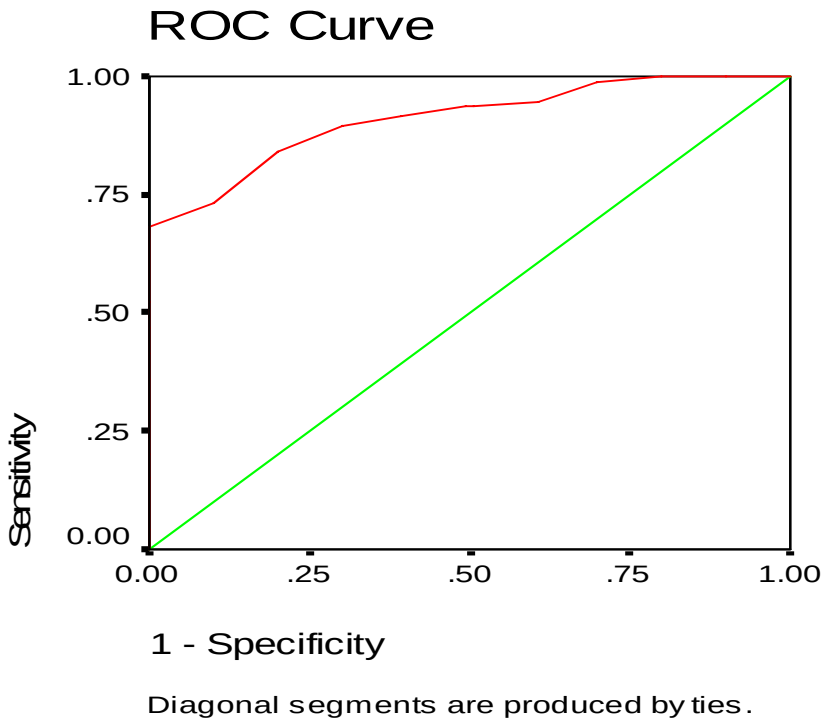


TABLE 18 : CBB CUT-OFF DETERMINATION

NNH	Predicted Group Membership		Total
Original	Positive	Negative	
Positive	80	14	94
Negative	206	520	726

Sensitivity = 85.11

Specificity = 71.63

Positive predictive value = 27.97

Neg Predictive = 97.38

CUTOFF VALUE =2.1

TABLE 19
Coordinates of the Curve for estimating Cut- off for CBB values

Test Result Variable(s): CBB

Positive if Greater Than or Equal To(a)	Sensitivity	1 - Specificity
.3000	1.000	1.000
1.3500	1.000	.899
1.4500	1.000	.799
1.5500	.989	.700
1.6500	.947	.606
1.7500	.936	.508
1.8500	.936	.492
1.9500	.915	.395
2.0500	.894	.300
2.1500	.840	.201
2.2500	.734	.101
2.3500	.681	.000
2.4500	.521	.000
2.6500	.468	.000
2.9500	.415	.000
3.1500	.362	.000
3.2500	.202	.000
3.3500	.149	.000
3.4500	.043	.000
4.5000	.000	.000

The test result variable(s): CBB has at least one tie between the positive actual state group and the negative actual state group.

a The smallest cutoff value is the minimum observed test value minus 1, and the largest cutoff value is the maximum observed test value plus 1. All the other cutoff values are the averages of two consecutive ordered observed test values.

FIG 34 : ROC CURVE FOR 24 HRS

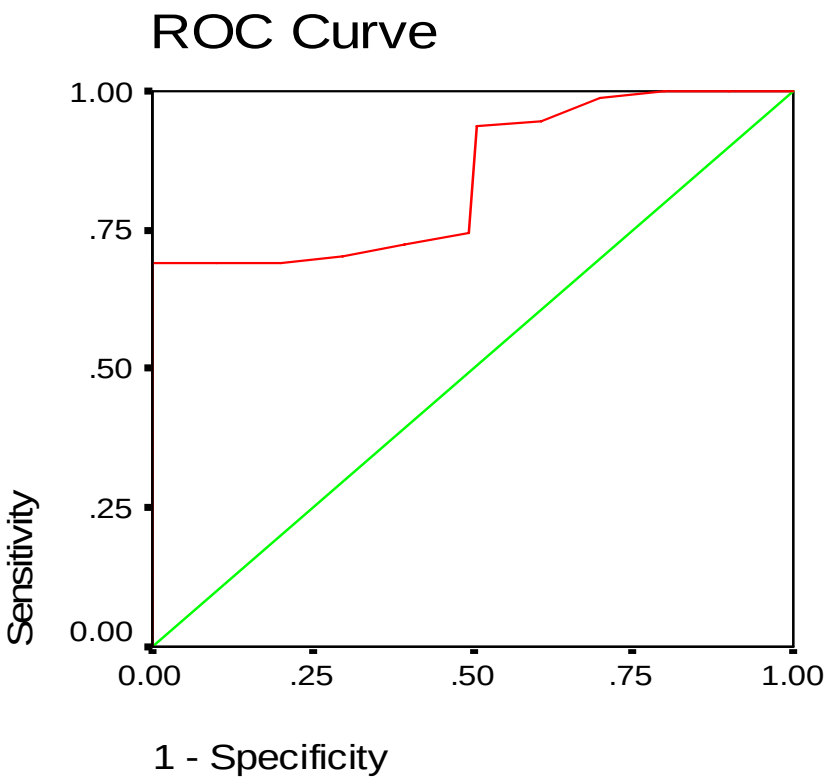


TABLE 20 : CUT- OFF FOR 24hr SRB

NNH	Predicted Group Membership		Total
Original	Positive	Negative	
Positive	84	10	94
Negative	226	500	726

Sensitivity = 89.36

Specificity = 68.87

Positive predictive value = 27.10

Neg Predictive = 98.04

CUTOFF VALUE = 4

TABLE 21

Coordinates of the Curve for estimating Cutt-off values for 24 hrs bilirubin level

Test Result Variable(s): 24hr SRB

Positive if Greater Than or Equal To(a)	Sensitivity	1 – Specificity
2.5000	1.000	1.000
3.5500	1.000	.899
3.6500	1.000	.799
3.7500	.989	.700
3.8500	.947	.606
3.9500	.936	.508
4.0500	.745	.492
4.1500	.723	.395
4.2500	.702	.299
4.3500	.691	.200
4.4500	.691	.099
4.7500	.691	.000
5.0500	.660	.000
5.2000	.606	.000
5.3500	.521	.000
5.4500	.489	.000
5.5500	.479	.000
5.6500	.426	.000
5.8000	.383	.000
5.9500	.372	.000
6.0500	.362	.000
6.2000	.351	.000
6.3500	.309	.000
6.4500	.255	.000
6.5500	.245	.000
6.6500	.213	.000
6.8000	.128	.000
8.9500	.074	.000
11.5000	.043	.000
13.0000	.000	.000

The test result variable(s): 24hr SRB has at least one tie between the positive actual state group and the negative actual state group.

The smallest cutoff value is the minimum observed test value minus 1, and the largest cutoff value is the maximum observed test value plus 1. All the other cutoff values are the averages of two consecutive ordered observed test values.

This implies that there is significant correlation between cord blood bilirubin & neonatal hyperbilirubinemia in the first 2 days screening values. Also level of cord blood bilirubin is found to be higher in these newborns with significant hyperbilirubinemia.

In order to predict cut off values for CBB levels, receiver operating curve analysis was used. Based on this, **CBB< 2.1 mg/dl** was found to have sensitivity of 85.11% & specificity of 71.63 % positive predictive value of 27.97 % and a **negative predictive value of 97.38 %**

For day1 bilirubin cut off levels< 4 mg/dl , similar ROC curve was used to estimate the value as sensitivity 89.36 % , specificity 68.87 %, positive predictive value of 27.10 % & **negative predictive value of 98.04 %**

DISCUSSION

DISCUSSION

The problems we face in managing NNH are multifold. Many early discharged neonates were readmitted for significant hyperbilirubinemia in the 1st week of life. This is a major financial and manpower strain on the government hospital.

According to AAP guidelines, all neonates discharged within 48hrs must be reviewed after 2-3 days for compulsory bilirubin level estimation. The logistics of this compulsory 48 hour review is not possible in our country and that too in a government hospital milieu. Therefore critical values of CBB are needed to differentiate **early safe discharge of neonates** and those requiring 48 hours monitoring.

Our study has strived to reduce these readmissions by CBB correlation of NNH. Due to the high negative predictive value for the cutoff levels, we can be very sure that those neonates below the cutoff can be safely discharged with least possibility of readmission.

Failure to detect NNH early on leads to **bilirubin encephalopathy or Kernicterus** a fully preventable debilitating disorder of the child. Cord blood screening can identify these NNH cases for early phototherapy, thereby fully preventing Kernicterus.

Compared to conventional venous sampling, cord blood screening is **Less Invasive** thereby easier to perform in various peripheral centers and also helps in reducing the sepsis rate by being non invasive.

Our methods of screening and management are very **cost effective and easier to perform.**

In our study, the aim was to assess the predictive ability of cord blood bilirubin & day 1 bilirubin levels in neonatal hyperbilirubinemia prediction.

During the course of the study there were a total of 6200 deliveries during the period of our study. Out of these we take upto into consideration of those healthy term neonates with ABO incompatibility only. Neonates with comorbid factors are excluded. After all these exclusion criteria , the total number of new born enrolled into study were 820. Among these 820, we had total number of 83 NNH. Thereby getting the incidence of 10.1% of NNH in ABO incompatible population.

Even though the prime aim was to find out correlation between cord blood bilirubin and NNH, we also analysed the relationship between sex of the babies and NNH, birth rate of babies and NNH, mode of deliveries a nd NNH. Also the percentage of phototherapy required and percentage of exchange transfusion totally carried out in the study are also analysed.

Regarding the sex of the child, in our study, there were 52 male child with ABO with NNH and 42 female child with ABO with NNH. After statistical evaluation of these children, the sex and blood group of NNH is found to have no correlation. . In the course of the study sex wise distribution, birth weight wise distribution was also assessed & there was no correlation between these two parameters and neonatal hyperbilirubinemia

Studies by Maisels & Kring& Satrya et al also predict more risk of NNH in the male child.

Awasthi & rahman(21)Rosami & Mehrabi ,Taksande show that there is no correlation between birth weight or sex of the baby.

Our study also shows no statistically significant correlation between the birth weight or sex of the baby in NNH.

With regard to the birth weight distribution, comparison made between each of these birth weight groups. Having these babies into consideration, AGA & SGA babies were evaluated. Around 8 neonates developed NNH out of 80 SGA babies. Out of 740 AGA babies, 12 developed NNH. ABO incompatibility causing NNH is 83. Of this 83 the number of OA incompatibility is 45 (incidence 54.2%) in 83 when compared to the number of OB incompatibility 36 (43.4%) which is less than that of OA.

TABLE 22 : BIRTH WEIGHT AND NNH

Birth weight	No: of babies	NNH	%
SGA(< 2.5kg)	80	8	10%
AGA(>2.5 kg)	740	60	12%

Incidence of NNH in our study is 11.46% including the control O group. 26 (50%) males belonging to 'A' group developed NNH. Out of which 4 required phototherapy. 19 (45.24%) females belong to 'A' group developed NNH and 2 required phototherapy.

There were 2 female cases of O-AB incompatibility which accounted for 4.8% 0f NNH.

TABLE 23: NNH & PHOTOTHERAPY DISTRIBUTION

Baby Group		NNH				Phototherapy			
		Male	Percent	Female	percent	male	Percent	female	percent
	A	26	50	19	45.2	4	15.4	2	10.5
	B	23	44.2	13	30.95	5	21.7	4	30.8
	O	3	5.8	8	19.05	-	-	-	-
	AB	-		2	4.8	-	-	-	-

23 males belonging to 'B' group developed NNH and out of this 5 required phototherapy. 13 females belonging to 'B' group developed NNH and 4 required phototherapy**. (30.95%) this implies O – B incompatibility is severe than OA.**

The reasons for Day 1 Bilirubin being given such importance is to include, non institutional deliveries where CBB screening was missed.

In our study the Receiver Operating Curve (ROC) was very essential. All parameters were plotted on the curve and the cut off values were statistically obtained.

The probability that a neonate with CBB > 2.1 will go on to hyperbilirubinemia was 27.97 % (positive predictive value).

The probability of a baby of **CBB < 2.1 mg/dl** not getting hyperbilirubinemia was 97.38%.**(negative predictive value)**

The probability that a neonate with Day 1 bilirubin > 4 will go on to hyperbilirubinemia was 27.10 %(positive predictive value).

The probability of a baby of **Day 1 bilirubin < 4** mg/dl not getting hyperbilirubinemia was 98.04 %.**(negative predictive value)**

TABLE 24: COMPARISON WITH PREVIOUS SIMILAR STUDIES:

STUDIES	**YEAR**	**NO. OF CASES**	**UMBILICAL CORD BILIRUBIN**
Knudson et al	1989	291	<1.17mg >2.34mg
Rosenfeld J et al	1986	-	<2mg >2mg
Bernaldo et al	2004	380	>2mg
Kaufer et al	2005	1100	<1.17 1.17 – 1.75 1.75 -2.34 >2.34
Amar t et al	2005	200	>2mg dl
OUR STUDY	**2014**	**820**	**>2.1**

TABLE 25 : STUDIES ON THE PREDICTIVE ABILITY OF CORD BLOOD BILIRUBIN LEVEL & NNH

Studies	Cut off Cord STB(mg/dl)	Sensitivity	Specificity	Positive predictive value	Negative predictive value
Amar Taksande et al(2005)	>2	89.5%	85%	38.8%	98.7%
Zakia Nahar et al (2009)	>2.5	77%	98.6%		96%
Knudsen(1989)	>2.35	13%	99%	85%	72%
Rudy Satrya et al(2009)	>2.54	90.5%	85%		
Sun et al (2007)	>2	68%		45.08%	
OUR STUDY	**>2.1**	**85.11%**	**71.63%**	**27.97**	**97.38**

TABLE 26 : MASTER TABLE FOR CBB VALUES AND NNH

CBB Level Mg/dl	NO. Of babies	Developed NNH +	Not developed NNH	NNH requiring phototherapy	NNH not requiring phototherapy	% of phototherapy	Exchange transfusion
1.3	73	0	73	-	-	-	-
1.4	73	0	73	-	-	-	-
1.5	73	0	73	-	-	-	-
1.6	72	0	72	-	-	-	-
1.7	72	0	72	-	-	-	-
1.8	12	0	12	-	-	-	-
1.9	72	0	72	-	-	-	-
2.0	71	0	71	-	-	-	-
2.1	77	5	72	0	72		
2.2	83	10	73	0	73		
2.3	78	5	73	0	73		
2.4	15	15	0	1	14	6.7	
2.5	5	5	0	0	5		
2.6	-	-		0			
2.7	-	-		0			
2.8	5	5	0	0	5		

CBB Level Mg/dl	NO. Of babies	Developed NNH +	Not developed NNH	NNH requiring phototherapy	NNH not requiring phototherapy	% of phototherapy	Exchange transfusion
2.9	-	-		0			
3.0	-	-		0			
3.1	5	5	0	1	4	20	
3.2	15	15	0	5	10	33	
3.3	5	5	0	2	3	40	1
3.4	10	10	0	4	6	40	1
3.5	4	4	0	2	2	50	
Total	820	83		15			2

Another significant importance of CBB prediction of NNH is in **planning for elective sterilization.** Presently whenever a O group mother delivers, we do not advise sterilization immediately, because the baby may develop pathological hyperbilirubinemia due to ABO incompatibility. But with the help of CBB, (if <2.1mg/dl) sterilization can be advised earlier to the mother(puerperal) or the father(NSV- No Scalpel Vasectomy) if the levels are below the cut off values

LIMITATIONS:

- In our study only healthy term babies were taken into consideration.
- A much bigger cohort study over a longer period of time including all cases of NNH will be helpful in showing the bigger picture about CBB role in accurate prediction of NNH.

CONCLUSION

CONCLUSION

NNH is a very common problem. It is also the most common cause of readmission in the first week of life. 97.38% negative predictive value implies that neonates with CBB < 2.1 mg/dl with ABO in compatibility are very unlikely to receive any further intervention. These babies can be **safely discharged early**.

It also implies that these children with ABO and CBB bilirubin >2.1, need monitoring for any future early intervention. Likewise, 24 hr bilirubin level cut off values have been fixed at 4mg/dl for predicting NNH severity. Those babies with 24 hr levels > 4mg/dl must be periodically screened for NNH. Thereby **reducing the chance of Kernicterus**.

Being less invasive, easy to perform, and cost effective, CBB screening in NNH is very economical.

Being easy to perform these values may be extrapolated in the outreach rural population for better screening of NNH.

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BIBLIOGRAPHY

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ANNEXURE – 1

PROFORMA

CORD BLOOD BILIRUBIN & NEONATAL HYPERBILIRUBINEMIA IN ABO INCOMPATIBILITY

PATIENT PROFILE - PROFORMA

SERIAL NO: LOST to FOLLOW UP

- BABY OF: IP NO: SEX:
- ADDRESS :
- WEIGHT: SGA /AGA / LGA SINGLE / TWIN
- DATE OF BIRTH: MODE OF DELIVERY:
- OBSTETRIC SCORE: LMP : EDD:
- H/O JAUNDICE IN SIBLING IN NEONATAL PERIOD:
- H/O MATERNAL DRUG INTAKE:
- BLOOD GROUP OF MOTHER: BABY:
- APGAR : 1' 5'
- GESTATIONAL AGE (NEW BALLARD SCORE):
- ANY CONGENITAL ANOMALY:
- CORD BLOOD BILIRUBIN LEVEL:
- SERUM BILIRUBIN LEVEL TOTAL INDIRECT DIRECT

  AT 24HRS :

  48HRS:

  72HRS:

- DIRECT COOMBS TEST:
- PERIPHERAL SMEAR STUDY:
- DAY OF APPEARANCE OF JAUNDICE:

- PHOTOTHERAPY: YES / NO

  DAY OF STARTING PHOTOTHERAPY DAY 1- DAY2 - DAY3-

  DURATION OF PHOTOTHERAPY –

- EXCHANGE TRANSFUSION: YES / NO

- DATE OF DISCHARGE:

INFORMED CONSENT FOR PARTICIPATION IN THE STUDY

I, W/O hereby consent to participate in this study where blood samples may be collected from the cord blood as well as venous blood to evaluate level of jaundice in my baby. I am fully aware that NO new, adventurous intervention is planned on my child as part of this study. Whatever treatment is given to my child based on these blood results is fully in the best interest of the child & is also the established treatment method in this hospital.

x¥òjš got«

ÂUkÂ f/bg. M»a eh‹ vdJ FHªijia Ïu¤j gçnrhjid¡F« mj‹ _y« el¡F« Ïªj MŒÎ¡F« KG kdJl‹ c£gL¤j r«kÂ¡»nw‹. Ïªj MŒéš, bjh¥òš bfhoæèUªJ«, Ïu¤j ehu§fëèUªJ« Ïu¤j vL¤J vdJ FHªijæ‹ fhkhiy mséid bjçªJ bfhŸs r«kÂ¡»nw‹. Ïªj gçnrhjidæš fhkhiyæ‹ msÎ mÂfkhf ÏUªjhš, mj‰F jFªj bjçªj, kUªJtkid tiuKiw¡F c£g£l Á»¢iræid brŒJ bfhŸs r«kÂ¡»nw‹. Ïªj MŒé‹ _y« vdJ FHªij¡F vªjéj òÂa ã%Ã¡fglhj Á»¢ir KiwÍ« më¡f nghtÂšiy v‹gijÍ« m¿nt‹.

DATE SIGNATURE / THUMBPRINT OF THE CAREGIVER

ANNEXURE – 2

MASTERCHART

IP No.	Sex	Birth weight	Baby GRP	CBB	24hr SRB	48 hr SRB	72 hr SRB	Phototherapy	photoday	photoduratio	day 4 SRB	ET	coombs	RETIC	PSS	Delivery	NNH	Baby GRP	Birth weight
11202	M	2.5	A	2.4	4	8	12	NP	.				-		N	N	H	1	2
11204	M	2.6	A	2.4	4	8	11	NP	.				-		N	L	H	1	2
11205	M	2.7	A	2.4	4	6	12	NP	.				-		N	L	H	1	2
11206	M	2.5	A	2.4	4	7	11	NP	.				-		N	AB	H	1	2
11209	M	2.6	A	3.5	5.5	11	11	P	2	1			dct+	6%	N	N	H	1	2
11213	M	2.7	A	3.5	6.5	9	14	P	3	2			dct+	6%	S+	L	H	1	2
11215	M	2.5	A	2.4	4	7	11	NP	.				-		N	N	H	1	2
11219	M	2.6	A	2.4	12	10	15	P	1	3			dct+	9%	S+	N	H	1	2
11223	M	2.7	A	2.4	4	8	12	NP	.				-		N	AB	H	1	2
11226	M	2.1	A	3.4	12	14	17	P	1	3	23	done	dct +	9%	S+	N	H	1	2
11229	M	2.1	O	1.3	3.5	7.3	8.5	NP	.				-			N	N	2	1
11236	M	2.9	O	1.4	3.6	7.4	8.6	NP	.				-			N	N	2	1
11231	M	2.1	O	1.5	3.7	7.5	8.7	NP	.				-			AB	N	2	1
11235	M	2	O	1.6	3.8	7.6	8.8	NP	.				-		N	N	H	2	1
11238	M	2.2	O	1.7	3.9	7.7	8.9	NP	.				-			N	N	2	1
11245	M	2	O	1.9	4.1	8.3	9.1	NP	.				-			N	N	2	1
11240	M	2	O	2	4.2	8.4	9.2	NP	.				-		N	L	H	2	1
11237	M	2.5	O	2.1	4.3	8.5	9.3	NP	.				-			L	N	2	1
11243	M	2.2	O	2.2	4.4	8.6	9.4	NP	.				-			L	N	2	1
11248	M	2	O	2.3	4.5	8.7	9.5	NP	.				-			L	N	2	1
11256	M	2.1	B	3.2	12	14	17	P	1	2			dct+	9%	S+	L	H	1	1
11253	M	2	B	3.2	4	8	11	NP	.				-		N	L	H	1	1
11257	M	2	B	3.2	11	10	14	P	1	2			dct+	8%	S+	L	H	1	1
11259	M	2.1	B	3.2	5	7	11	NP	.				-		N	L	H	1	1
11262	M	2.2	B	3.2	5.4	11	15	P	2	1			dct+	6%	N	L	H	1	1
11264	M	2	B	3.2	6.6	9	13	NP	.				-		N	N	H	1	1
11265	M	2	B	3.2	4	8	12	NP	.				-		N	N	H	1	1
11267	M	2.2	B	3.2	4	8	12	NP	.				-		N	N	H	1	1
11269	M	4	B	3.2	4	7	11	NP	.				-		N	N	H	1	4
11274	M	4.1	B	3.2	4	7	11	NP	.				-		N	N	H	1	4
11283	M	3	O	1.3	3.5	7.3	8.5	NP	.				-			L	N	2	3
11293	M	3.1	O	1.4	3.6	7.4	8.6	NP	.				-			L	N	2	3
11295	M	3.2	O	1.5	3.7	7.5	8.7	NP	.				-			L	N	2	3

11296	M	3	O	1.6	3.8	7.6	8.7	NP	.				-		N	L	H	2	3
11298	M	3.2	O	1.7	3.9	7.7	8.9	NP	.				-			L	N	2	3
11300	M	3.2	O	1.9	4.1	9.3	9.1	NP	.				-		N	L	H	2	3
11303	M	3.1	O	2	4.2	8.4	9.2	NP	.				-			L	N	2	3
11305	M	3.1	O	2.1	4.3	8.5	9.3	NP	.				-			L	N	2	3
11306	M	3	O	2.2	4.4	8.6	9.4	NP	.				-			L	N	2	3
11309	M	3	O	2.3	4.5	8.7	9.5	NP	.				-			L	N	2	3
11310	M	2.5	A	2.2	5.3	6	10	NP	.				-		N	N	H	1	2
11314	M	2.6	A	2.2	5.3	7	11	NP	.				-		N	N	H	1	2
11316	M	2.7	A	2.2	5.3	8	12	NP	.				-		N	N	H	1	2
11318	M	2.5	A	2.2	5.3	6	10	NP	.				-		N	N	H	1	2
11322	M	2.6	A	2.2	5.3	7	11	NP	.				-		N	N	H	1	2
11325	M	2.7	A	2.2	6.7	8	12	NP	.				-		N	L	H	1	2
11328	M	2.5	A	2.2	6.7	9	13	NP	.				-	7%	N	L	H	1	2
11330	M	2.6	A	2.2	6.7	9	13	NP	.				-		N	L	H	1	2
11335	M	2.7	A	2.2	6.7	8	12	NP	.				-		N	L	H	1	2
11337	M	2.5	A	2.2	6.7	9	13	NP	.				-	6%	N	L	H	1	2
11338	M	2	O	1.3	3.5	7.3	8.5	NP	.				-			N	N	2	1
11339	M	2.2	O	1.4	3.6	7.4	8.6	NP	.				-			N	N	2	1
11343	M	2.1	O	1.5	3.7	7.5	8.7	NP	.				-			N	N	2	1
11346	M	2	O	1.6	3.8	8.6	8.8	NP	.				-		N	N	H	2	1
11348	M	2.2	O	1.7	3.9	7.7	8.9	NP	.				-			N	N	2	1
11401	M	2.1	O	1.9	4.1	8.3	9.1	NP	.				-			N	N	2	1
11353	M	2	O	2	4.2	9.3	9.2	NP	.				-		N	N	H	2	1
11356	M	2.1	O	2.1	4.3	8.5	9.3	NP	.				-			N	N	2	1
11358	M	2.2	O	2.2	4.4	8.6	9.4	NP	.				-			N	N	2	1
11367	M	2	O	2.3	4.5	8.7	9.5	NP	.				-			N	N	2	1
11365	M	2.5	B	2.4	5.6	8	12	NP	.				-		N	N	H	1	2
11368	M	2.6	B	3.4	5.6	8	12	NP	.				-		N	N	H	1	2
11370	M	2.7	B	3.4	5.6	8	11	NP	.				-		N	N	H	1	2
11373	M	2.5	B	3.4	5.6	9	13	NP	.				-		N	N	H	1	2
11375	M	2.6	B	3.4	5.6	9	12	NP	.				-		N	N	H	1	2
11378	M	2.7	B	3.4	6.4	9	13	NP	.				-		N	L	H	1	2
11380	M	2.5	B	3.4	6.4	9	11	NP	.				-		N	L	H	1	2

11383	M	2.6	B	3.4	6.4	10	15	P	3	1			dct+	6%	N	AB	H	1	2
11385	M	2.7	B	3.4	6.4	11	14	NP	.				-		N	L	H	1	2
11389	M	2.5	B	3.4	6.4	14	16	P	2	1			dct+	6%	N	L	H	1	2
11398	M	2	O	1.3	3.5	7.3	8.5	NP	.				-			L	N	2	1
11402	M	2.1	O	1.4	3.6	7.4	8.6	NP	.				-			L	N	2	1
11407	M	2.2	O	1.5	3.7	7.5	8.7	NP	.				-			L	N	2	1
11409	M	2	O	1.6	3.8	8.8	8.8	NP	.				-		N	L	H	2	1
11415	M	2.2	O	1.7	3.9	7.7	8.9	NP	.				-			L	N	2	1
11534	M	2.1	O	1.9	4.1	9.3	9.1	NP	.				-		N	L	H	2	1
11420	M	2	O	2	4.2	8.4	9.2	NP	.				-			L	N	2	1
11430	M	2	O	2.1	4.3	8.5	9.3	NP	.				-			L	N	2	1
11506	M	2	O	2.2	4.4	8.6	9.4	NP	.				-			L	N	2	1
11607	M	2.1	O	2.3	4.5	8.7	9.5	NP	.				-			L	N	2	1
11709	M	2.5	A	3.5	5.7	9	13	NP	.				-		N	L	H	1	2
12638	M	2.6	B	3.5	5.7	9	13	NP	.				-		N	L	H	1	2
12662	M	2.7	A	3.5	5.7	9	13	NP	.				-		N	L	H	1	2
12674	M	2.5	B	3.5	5.7	8	12	NP	.				-		N	L	H	1	2
12685	M	2.6	A	2.1	6	8	12	NP	.				-		N	L	H	1	2
12697	M	2.7	A	2.1	6.3	8	12	NP	.				-		N	L	H	1	2
12700	M	2.5	B	2.1	6.3	9	13	NP	.				-		N	N	H	1	2
12635	M	2.6	A	2.1	6.3	9	13	NP	.				-		N	N	H	1	2
12465	M	2.7	A	2.8	6.3	9	10	NP	.				-		N	N	H	1	2
12730	M	2.5	O	1.3	3.5	7.3	8.5	NP	.				-			N	N	2	2
12746	M	3	O	1.4	3.6	7.4	8.6	NP	.				-			N	N	2	3
12748	M	3.2	O	1.5	3.7	7.5	8.7	NP	.				-			N	N	2	3
12751	M	3.1	O	1.6	3.8	7.6	8.8	NP	.				-			N	N	2	3
12761	M	3.2	O	1.7	3.9	8.8	8.9	NP	.				-		N	N	H	2	3
12784	M	3.2	O	1.9	4.1	8.3	9.1	NP	.				-			N	N	2	3
12783	M	3	O	2	4.2	8.4	9.2	NP	.				-			N	N	2	3
12790	M	3	O	2.1	4.3	8.9	9.3	NP	.				-		N	N	H	2	3
12795	M	3.1	O	2.2	4.4	8.6	9.4	NP	.				-			N	N	2	3
12794	M	3.1	O	2.3	4.5	8.7	9.5	NP	.				-			N	N	2	3
12785	M	2.5	O	1.3	3.5	7.3	8.5	NP	.				-			L	N	2	2
12745	M	2.6	O	1.4	3.6	7.4	8.6	NP	.				-			L	N	2	2

12865	M	2.7	O	1.5	3.7	8.5	8.7	NP	.				-		N	L	H	2	2
12863	M	2.5	O	1.6	3.8	7.6	8.8	NP	.				-			L	N	2	2
12635	M	2.6	O	1.7	3.9	7.7	8.9	NP	.				-			L	N	2	2
12874	M	2.5	O	1.8	4.1	8.3	9.1	NP	.				-			L	N	2	2
12882	M	2.5	O	1.9	4.2	8.4	9.2	NP	.				-			L	N	2	2
12889	M	2.6	O	2	4.3	8.5	9.3	NP	.				-			L	N	2	2
12893	M	2.5	O	2.1	4.5	8.6	9.4	NP	.				-			L	N	2	2
12897	M	2.6	O	2.2	3.5	8.7	9.5	NP	.				-			L	N	2	2
12900	M	2.5	O	2.3	3.6	7.3	8.5	NP	.				-			N	N	2	2
12904	M	2.6	O	1.3	3.7	7.4	8.6	NP	.				-			N	N	2	2
12908	M	2.5	O	1.4	3.8	7.5	8.7	NP	.				-			N	N	2	2
12915	M	2.7	O	1.5	3.9	7.6	8.8	NP	.				-			N	N	2	2
12918	M	2.6	O	1.6	4.1	7.7	8.9	NP	.				-			N	N	2	2
12924	M	2.7	O	1.7	4.2	8.3	9.1	NP	.				-			N	N	2	2
12928	M	2.6	O	1.9	4.3	8.4	9.2	NP	.				-			N	N	2	2
12840	M	2.5	O	2	4.4	8.5	9.3	NP	.				-			N	N	2	2
12859	M	2.6	O	2.1	4.5	8.6	9.4	NP	.				-			N	N	2	2
12968	M	2.5	O	2.2	4	8	9	NP	.				-			N	N	2	2
12875	M	2.6	O	2.3	4.5	7.3	9.5	NP	.				-			L	N	2	2
12883	M	2.5	O	1.3	3.5	7.4	8.5	NP	.				-			L	N	2	2
12986	M	2.6	O	1.4	3.6	7.5	8.6	NP	.				-			L	N	2	2
12892	M	2.5	O	1.5	3.7	7.6	8.7	NP	.				-			L	N	2	2
12896	M	2.6	O	1.6	3.8	7.7	8.8	NP	.				-			L	N	2	2
12999	M	2.7	O	1.7	3.9	8.3	8.9	NP	.				-			L	N	2	2
13007	M	2.7	O	1.9	4.1	8.4	9.1	NP	.				-			L	N	2	2
13010	M	2.6	O	2	4.2	8.5	9.2	NP	.				-			L	N	2	2
13017	M	2.5	O	2.1	4.3	8.6	9.3	NP	.				-			L	N	2	2
13016	M	2.7	O	2.2	4.4	8.7	9.4	NP	.				-			L	N	2	2
13025	M	2.5	O	2.3	4.5	7.3	9.5	NP	.				-			N	N	2	2
13027	M	2.6	O	1.3	3.5	7.4	8.5	NP	.				-			N	N	2	2
13032	M	2.7	O	1.4	3.6	7.5	8.6	NP	.				-			N	N	2	2
13040	M	2.6	O	1.5	3.7	7.6	8.7	NP	.				-			N	N	2	2
13048	M	2.5	O	1.6	3.8	7.7	8.8	NP	.				-			N	N	2	2
13056	M	2.6	O	1.7	3.9	8.3	8.9	NP	.				-			N	N	2	2

13062	M	2.5	O	1.9	4.1	8.4	9.1	NP	.				-			N	N	2	2
13073	M	2.5	O	2	4.2	8.5	9.2	NP	.				-			N	N	2	2
13083	M	2.6	O	2.1	4.3	8.6	9.3	NP	.				-			N	N	2	2
13095	M	2.5	O	2.2	4.4	8.7	9.4	NP	.				-			N	N	2	2
13116	M	2.6	O	2.3	4.5	8.7	9.5	NP	.				-			L	N	2	2
13124	M	2.5	O	1.3	3.5	7.3	8.5	NP	.				-			L	N	2	2
13137	M	2.6	O	1.4	3.6	7.4	8.6	NP	.				-			L	N	2	2
13144	M	2.5	O	1.5	3.7	7.5	8.7	NP	.				-			L	N	2	2
13147	M	2.6	O	1.6	3.8	7.6	8.8	NP	.				-			L	N	2	2
13256	M	2.5	O	1.7	3.9	7.7	8.9	NP	.				-			L	N	2	2
13278	M	2.5	O	1.9	4.1	8.3	9.1	NP	.				-			L	N	2	2
13298	M	2.6	O	2	4.2	8.4	9.2	NP	.				-			L	N	2	2
13318	M	2.5	O	2.1	4.3	8.5	9.3	NP	.				-			L	N	2	2
13325	M	2.6	O	2.2	4.4	8.6	9.4	NP	.				-			L	N	2	2
13328	M	2.5	O	2.3	4.5	8.7	9.5	NP	.				-			N	N	2	2
13337	M	2.6	O	1.3	3.5	7.3	8.5	NP	.				-			N	N	2	2
13343	M	2.7	O	1.4	3.6	7.4	8.6	NP	.				-			N	N	2	2
13348	M	2.7	O	1.5	3.7	7.5	8.7	NP	.				-			N	N	2	2
13356	M	2.7	O	1.6	3.8	7.6	8.8	NP	.				-			N	N	2	2
13359	M	2.5	O	1.7	3.9	7.7	8.9	NP	.				-			N	N	2	2
13363	M	2.6	O	1.9	4.1	8.3	9.1	NP	.				-			N	N	2	2
13367	M	2.5	O	2	4.2	8.4	9.2	NP	.				-			N	N	2	2
13373	M	2.5	O	2.1	4.3	8.5	9.3	NP	.				-			N	N	2	2
13376	M	2.6	O	2.2	4.4	8.6	9.4	NP	.				-			N	N	2	2
13379	M	2.5	O	2.3	4.5	8.7	9.5	NP	.				-			L	N	2	2
13383	M	2.6	O	1.3	3.5	7.3	8.5	NP	.				-			L	N	2	2
13394	M	2.7	O	1.4	3.6	7.4	8.6	NP	.				-			L	N	2	2
13404	M	2.5	O	1.5	3.7	7.5	8.7	NP	.				-			L	N	2	2
13413	M	2.5	O	1.6	3.8	7.6	8.8	NP	.				-			L	N	2	2
13427	M	2.6	O	1.7	3.9	7.7	8.9	NP	.				-			L	N	2	2
13468	M	2.5	O	1.9	4.1	8.3	9.1	NP	.				-			L	N	2	2
13484	M	2.6	O	2	4.2	8.4	9.2	NP	.				-			L	N	2	2
13492	M	2.5	O	2.1	4.3	8.5	9.3	NP	.				-			L	N	2	2
13567	M	2.6	O	2.2	4.4	8.6	9.4	NP	.				-			L	N	2	2

13578	M	2.5	O	2.3	4.5	8.7	9.5	NP	.				-			N	N	2	2
13583	M	2.6	O	1.3	3.5	7.3	8.5	NP	.				-			N	N	2	2
13593	M	2.7	O	1.4	3.6	7.4	8.6	NP	.				-			N	N	2	2
13610	M	2.7	O	1.5	3.7	7.5	8.7	NP	.				-			N	N	2	2
13627	M	2.7	O	1.6	3.8	7.6	8.8	NP	.				-			N	N	2	2
13635	M	2.5	O	1.7	3.9	7.7	8.9	NP	.				-			N	N	2	2
13637	M	2.6	O	1.9	4.1	8.3	9.1	NP	.				-			N	N	2	2
13640	M	2.5	O	2	4.2	8.4	9.2	NP	.				-			N	N	2	2
13642	M	2.6	O	2.1	4.3	8.5	9.3	NP	.				-			N	N	2	2
13647	M	2.6	O	2.2	4.4	8.6	9.4	NP	.				-			N	N	2	2
13653	M	2.1	O	2.3	4.5	8.7	9.5	NP	.				-			L	N	2	1
13660	M	2.2	O	1.3	3.5	7.3	8.5	NP	.				-			L	N	2	1
13664	M	2.1	O	1.4	3.6	7.4	8.6	NP	.				-			L	N	2	1
13666	M	2.2	O	1.5	3.7	7.5	8.7	NP	.				-			L	N	2	1
13669	M	2	O	1.6	3.8	7.6	8.8	NP	.				-			L	N	2	1
13673	M	2.2	O	1.7	3.9	7.7	8.9	NP	.				-			L	N	2	1
13675	M	2.2	O	2.3	4.1	8.3	9.1	NP	.				-			L	N	2	1
13679	M	2	O	1.9	4.2	8.4	9.2	NP	.				-			L	N	2	1
13682	M	2.1	O	2	4.3	8.5	9.3	NP	.				-			L	N	2	1
13685	M	2.5	O	2.1	4.4	8.6	9.4	NP	.				-			L	N	2	2
13689	M	2.5	O	2.2	4.5	8.7	9.5	NP	.				-			N	N	2	2
13693	M	2.6	O	2.3	3.5	7.3	8.5	NP	.				-			N	N	2	2
13699	M	2.6	O	1.3	3.6	7.4	8.6	NP	.				-			N	N	2	2
13702	M	2.6	O	1.4	3.7	7.5	8.7	NP	.				-			N	N	2	2
13704	M	2.6	O	1.5	3.8	7.6	8.8	NP	.				-			N	N	2	2
13707	M	2.6	O	1.6	3.9	7.7	8.9	NP	.				-			N	N	2	2
13712	M	2.5	O	1.7	4.1	8.3	9.1	NP	.				-			N	N	2	2
13714	M	2.5	O	1.9	4.2	8.4	9.2	NP	.				-			N	N	2	2
13718	M	2.6	O	2	4.3	8.5	9.3	NP	.				-			N	N	2	2
13722	M	2.1	O	2.1	4.4	8.6	9.4	NP	.				-			N	N	2	1
13724	M	2.2	O	2.2	4.5	8.7	9.5	NP	.				-			N	N	2	1
13729	M	2	O	2.3	4	8	9	NP	.				-			L	N	2	1
13732	M	2	O	1.3	3.5	7.3	8.5	NP	.				-			L	N	2	1
13738	M	2	O	1.4	3.6	7.4	8.6	NP	.				-			L	N	2	1

13741	M	2.2	O	1.5	3.7	7.5	8.78	NP	.				-			L	N	2	1
13743	M	2	O	1.6	3.8	7.6	0.8	NP	.				-			L	N	2	1
13747	M	2.1	O	1.7	3.9	7.7	8.9	NP	.				-			L	N	2	1
13750	M	2	O	1.9	4.1	8.3	9.1	NP	.				-			L	N	2	1
13752	M	2.1	O	2	4.2	8.4	9.2	NP	.				-			L	N	2	1
13758	M	2.5	O	2.1	4.3	8.5	9.3	NP	.				-			L	N	2	2
13761	M	2.6	O	2.2	4.4	8.6	9.4	NP	.				-			L	N	2	2
13772	M	2.5	O	2.3	4.5	8.7	9.5	NP	.				-			N	N	2	2
13777	M	2.6	O	1.3	3.5	7.3	8.5	NP	.				-			N	N	2	2
13778	M	2.5	O	1.4	3.6	7.4	8.6	NP	.				-			N	N	2	2
13779	M	2.6	O	1.5	3.7	7.5	8.7	NP	.				-			N	N	2	2
13782	M	2.5	O	1.6	3.8	7.6	8.8	NP	.				-			N	N	2	2
13785	M	2.6	O	1.7	3.9	7.7	8.9	NP	.				-			N	N	2	2
13787	M	2.7	O	1.9	4.1	8.3	9.1	NP	.				-			N	N	2	2
13789	M	2.7	O	2	4.2	8.4	9.2	NP	.				-			N	N	2	2
13792	M	2.7	O	2.1	4.3	8.5	9.3	NP	.				-			N	N	2	2
13795	M	2.5	O	2.2	4.4	8.6	9.4	NP	.				-			N	N	2	2
13799	M	2.5	O	2.3	4.5	8.7	9.5	NP	.				-			L	N	2	2
13800	M	2.5	O	1.3	3.5	7.3	8.5	NP	.				-			L	N	2	2
13802	M	2.5	O	1.4	3.6	7.4	8.6	NP	.				-			L	N	2	2
13804	M	2.6	O	1.5	3.7	7.5	8.7	NP	.				-			L	N	2	2
13806	M	2.6	O	1.6	3.8	7.6	8.8	NP	.				-			L	N	2	2
13808	M	2.6	O	1.7	3.9	7.7	8.9	NP	.				-			L	N	2	2
13806	M	2.5	O	1.9	4.1	8.3	9.1	NP	.				-			L	N	2	2
13807	M	2.6	O	2	4.2	8.4	9.2	NP	.				-			L	N	2	2
13809	M	2.5	O	2.1	4.3	8.5	9.3	NP	.				-			L	N	2	2
13811	M	2.6	O	2.2	4.4	8.6	9.4	NP	.				-			L	N	2	2
13814	M	2.5	O	2.3	4.5	8.7	9.5	NP	.				-			N	N	2	2
13816	M	2.5	O	1.3	3.5	7.3	8.5	NP	.				-			N	N	2	2
13817	M	2.6	O	1.4	3.6	7.4	8.6	NP	.				-			N	N	2	2
13818	M	2.5	O	1.5	3.7	7.5	8.7	NP	.				-			N	N	2	2
13819	M	2.6	O	1.6	3.8	7.6	8.8	NP	.				-			N	N	2	2
13821	M	2.5	O	1.7	3.9	7.7	8.9	NP	.				-			N	N	2	2
13822	M	2.6	O	1.9	4.1	8.3	9.1	NP	.				-			N	N	2	2

13824	M	2.5	O	2	4.2	8.4	9.2	NP	.				-			N	N	2	2
13825	M	2.6	O	2.1	4.3	8.5	9.3	NP	.				-			N	N	2	2
13826	M	2.7	O	2.2	4.4	8.6	9.4	NP	.				-			N	N	2	2
13828	M	2.7	O	2.3	4.5	8.7	9.5	NP	.				-			L	N	2	2
13832	M	2.7	O	1.3	3.5	7.3	8.5	NP	.				-			L	N	2	2
13835	M	2.5	O	1.4	3.6	7.4	8.6	NP	.				-			L	N	2	2
13836	M	2.6	O	1.5	3.7	7.5	8.7	NP	.				-			L	N	2	2
13837	M	2.5	O	1.6	3.8	7.6	8.8	NP	.				-			L	N	2	2
13838	M	2.6	O	1.7	3.9	7.7	8.9	NP	.				-			L	N	2	2
13842	M	2.7	O	1.9	4.1	8.3	9.1	NP	.				-			L	N	2	2
13843	M	2.5	O	2	4.2	8.4	9.2	NP	.				-			L	N	2	2
13845	M	2	O	2.1	4.3	8.5	9.3	NP	.				-			L	N	2	1
13846	M	2.1	O	2.2	4.4	8.6	9.4	NP	.				-			L	N	2	1
13847	M	2	O	2.3	4.5	8.7	9.5	NP	.				-			N	N	2	1
13849	M	2	O	1.3	3.5	7.3	8.5	NP	.				-			N	N	2	1
13851	M	2	O	1.4	3.6	7.4	8.6	NP	.				-			N	N	2	1
13856	M	2.1	O	1.5	3.7	7.5	8.7	NP	.				-			N	N	2	1
13859	M	2.2	O	1.6	3.8	7.6	8.8	NP	.				-			N	N	2	1
13857	M	2	O	1.7	3.9	7.7	8.9	NP	.				-			N	N	2	1
13858	M	2.1	O	1.9	4.1	8.3	9.1	NP	.				-			N	N	2	1
13860	M	2	O	2	4.2	8.4	9.2	NP	.				-			N	N	2	1
13862	M	2.9	O	2.1	4.3	8.5	9.3	NP	.				-			N	N	2	3
13864	M	3	O	2.2	4.4	8.6	9.4	NP	.				-			N	N	2	3
13865	M	3.1	O	2.3	4.5	8.7	9.5	NP	.				-			N	N	2	3
13867	M	3.2	O	1.3	3.5	7.3	8.5	NP	.				-			N	N	2	3
13868	M	3.2	O	1.4	3.6	7.4	8.6	NP	.				-			N	N	2	3
13869	M	3.2	O	1.5	3.7	7.5	8.7	NP	.				-			N	N	2	3
13871	M	3.1	O	1.6	3.8	7.6	8.8	NP	.				-			N	N	2	3
13872	M	3.1	O	1.7	3.9	7.7	8.9	NP	.				-			N	N	2	3
13875	M	3	O	1.9	4.1	8.3	9.1	NP	.				-			N	N	2	3
13876	M	3.1	O	2	4.2	8.4	9.2	NP	.				-			N	N	2	3
13878	M	3.2	O	2.1	4.3	8.5	9.3	NP	.				-			N	N	2	3
13881	M	3.1	O	2.2	4.4	8.6	9.4	NP	.				-			N	N	2	3
13882	M	3.2	O	2.3	4.5	8.7	9.5	NP	.				-			L	N	2	3

13884	M	3	O	1.3	3.5	7.3	8.5	NP	.				-			L	N	2	3
13885	M	3.1	O	1.4	3.6	7.4	8.6	NP	.				-			L	N	2	3
13885	M	3.2	O	1.5	3.7	7.5	8.7	NP	.				-			L	N	2	3
13887	M	3	O	1.6	3.8	7.6	8.8	NP	.				-			L	N	2	3
13889	M	3.1	O	1.7	3.9	7.7	8.9	NP	.				-			L	N	2	3
13891	M	3.1	O	1.9	4.1	8.3	9.1	NP	.				-			L	N	2	3
13892	M	3	O	2	4.2	8.4	9.2	NP	.				-			L	N	2	3
13894	M	3	O	2.1	4.3	8.5	9.3	NP	.				-			L	N	2	3
13895	M	3	O	2.2	4.4	8.6	9.4	NP	.				-			L	N	2	3
13895	M	3	O	2.3	4.5	8.7	9.5	NP	.				-			L	N	2	3
13896	M	3	O	2.3	4.4	7.3	9.5	NP	.				-			L	N	2	3
13897	M	3	O	2.2	4.3	7.4	9.4	NP	.				-			L	N	2	3
13900	M	3.1	O	2.1	4.2	7.5	9.3	NP	.				-			L	N	2	3
13902	M	3.1	O	2	4.1	7.6	9.2	NP	.				-			L	N	2	3
13904	M	3.2	O	1.9	3.9	7.7	9.1	NP	.				-			L	N	2	3
13905	M	3	O	1.7	4.5	8.3	8.9	NP	.				-			L	N	2	3
13907	M	3	O	1.6	3.8	8.4	8.8	NP	.				-			L	N	2	3
13910	M	3.2	O	1.5	3.7	8.5	8.7	NP	.				-			L	N	2	3
13914	M	3.1	O	1.4	3.6	8.6	8.6	NP	.				-			L	N	2	3
13916	M	3.2	O	1.3	3.5	8.7	8.5	NP	.				-			L	N	2	3
13919	M	3.1	O	1.3	3.5	7.3	8.5	NP	.				-			N	N	2	3
13923	M	3.2	O	1.4	3.6	7.4	8.6	NP	.				-			N	N	2	3
13926	M	3.1	O	1.5	3.7	7.5	8.7	NP	.				-			N	N	2	3
13929	M	3.2	O	1.6	3.8	7.6	8.8	NP	.				-			N	N	2	3
13931	M	3	O	1.7	3.9	7.7	8.9	NP	.				-			N	N	2	3
13933	M	3.1	O	1.9	4.1	8.3	9.1	NP	.				-			N	N	2	3
13935	M	3.2	O	2	4.2	8.4	9.2	NP	.				-			N	N	2	3
13937	M	3	O	2.1	4.3	8.5	9.3	NP	.				-			N	N	2	3
13939	M	3	O	2.2	4.4	8.6	9.4	NP	.				-			N	N	2	3
13941	M	3.1	O	2.3	4.5	8.7	9.5	NP	.				-			N	N	2	3
13942	M	3.2	O	1.3	3.5	7.3	8.5	NP	.				-			N	N	2	3
13944	M	3	O	1.4	3.6	7.4	8.6	NP	.				-			N	N	2	3
13947	M	3.1	O	1.5	3.7	7.5	8.7	NP	.				-			N	N	2	3
13950	M	3.2	O	1.6	3.8	7.6	8.8	NP	.				-			N	N	2	3

13964	M	3.1	O	1.7	3.9	7.7	8.9	NP	.				-			N	N	2	3
13967	M	3.2	O	1.9	4.1	8.3	9.1	NP	.				-			N	N	2	3
13969	M	3.1	O	2	4.2	8.4	9.2	NP	.				-			N	N	2	3
13972	M	3.2	O	2.1	4.3	8.5	9.3	NP	.				-			N	N	2	3
13975	M	3	O	2.2	4.4	8.6	9.4	NP	.				-			N	N	2	3
13976	M	3.1	O	2.3	4.5	8.7	9.5	NP	.				-			N	N	2	3
13979	M	3	O	1.3	3.5	7.3	8.5	NP	.				-			L	N	2	3
13981	M	3.1	O	1.4	3.6	7.4	8.6	NP	.				-			L	N	2	3
13984	M	3.2	O	1.5	3.7	7.5	8.7	NP	.				-			L	N	2	3
13986	M	3.1	O	1.6	3.8	7.6	8.8	NP	.				-			L	N	2	3
13988	M	3.2	O	1.7	3.9	7.7	8.9	NP	.				-			L	N	2	3
13989	M	3.2	O	1.9	4.1	8.3	9.1	NP	.				-			L	N	2	3
13992	M	3.1	O	2	4.2	8.4	9.2	NP	.				-			L	N	2	3
13995	M	3.2	O	2.1	4.3	8.5	9.3	NP	.				-			L	N	2	3
13999	M	3.2	O	2.2	4.4	8.6	9.4	NP	.				-			L	N	2	3
14003	M	3.1	O	2.3	4.5	8.7	9.5	NP	.				-			L	N	2	3
14006	M	3	O	1.3	3.5	7.3	8.5	NP	.				-			L	N	2	3
14008	M	3.2	O	1.4	3.6	7.4	8.6	NP	.				-			L	N	2	3
14010	M	3.1	O	1.5	3.7	7.5	8.7	NP	.				-			L	N	2	3
14014	M	3.2	O	1.6	3.8	7.6	8.8	NP	.				-			L	N	2	3
14016	M	3.1	O	1.7	3.9	7.7	8.9	NP	.				-			L	N	2	3
14017	M	3.2	O	1.9	4.1	8.3	9.1	NP	.				-			L	N	2	3
14018	M	3.1	O	2	4.2	8.4	9.2	NP	.				-			L	N	2	3
14020	M	3.2	O	2.1	4.3	8.5	9.3	NP	.				-			L	N	2	3
14024	M	3.2	O	2.2	4.4	8.6	9.4	NP	.				-			L	N	2	3
14025	M	3.1	O	2.3	4.5	8.7	9.5	NP	.				-			L	N	2	3
14026	M	3.2	O	1.3	3.5	7.3	8.5	NP	.				-			N	N	2	3
14027	M	3.1	O	1.4	3.6	7.4	8.6	NP	.				-			N	N	2	3
14029	M	3.2	O	1.5	3.7	7.5	8.7	NP	.				-			N	N	2	3
14030	M	3.1	O	1.6	3.8	7.6	8.8	NP	.				-			N	N	2	3
14032	M	3	O	1.7	3.9	7.7	8.9	NP	.				-			N	N	2	3
14033	M	3	O	1.9	4.1	8.3	9.1	NP	.				-			N	N	2	3
14036	M	3	O	2	4.2	8.4	9.2	NP	.				-			N	N	2	3
14038	M	3	O	2.1	4.3	8.5	9.3	NP	.				-			N	N	2	3

14039	M	3	O	2.2	4.4	8.6	9.4	NP	.				-			N	N	2	3
14041	M	3.2	O	2.3	4.5	8.7	9.5	NP	.				-			N	N	2	3
14043	M	3.1	O	1.3	3.5	7.3	8.5	NP	.				-			N	N	2	3
14045	M	3.2	O	1.4	3.6	7.4	8.6	NP	.				-			N	N	2	3
14046	M	3.1	O	1.5	3.7	7.5	8.7	NP	.				-			N	N	2	3
14047	M	3.2	O	1.6	3.8	7.6	8.8	NP	.				-			N	N	2	3
14048	M	3	O	1.7	3.9	7.7	8.9	NP	.				-			N	N	2	3
14049	M	3	O	1.9	4.1	8.3	9.1	NP	.				-			N	N	2	3
14051	M	3.2	O	2	4.2	8.4	9.2	NP	.				-			N	N	2	3
14053	M	3.2	O	2.1	4.3	8.5	9.3	NP	.				-			N	N	2	3
14055	M	3	O	2.2	4.4	8.6	9.4	NP	.				-			N	N	2	3
14056	M	3.1	O	2.3	4.5	8.7	9.5	NP	.				-			N	N	2	3
14057	M	3.2	O	1.3	3.5	7.3	8.5	NP	.				-			L	N	2	3
14059	M	3.1	O	1.4	3.6	7.4	8.6	NP	.				-			L	N	2	3
14061	M	3.2	O	1.5	3.7	7.5	8.7	NP	.				-			L	N	2	3
14063	M	3.2	O	1.6	3.8	7.6	8.8	NP	.				-			L	N	2	3
14063	M	3.1	O	1.7	3.9	7.7	8.9	NP	.				-			L	N	2	3
14065	M	3	O	1.9	4.1	8.3	9.1	NP	.				-			L	N	2	3
14067	M	3.1	O	2	4.2	8.4	9.2	NP	.				-			L	N	2	3
14069	M	3.2	O	2.1	4.3	8.5	9.3	NP	.				-			L	N	2	3
14071	M	3.2	O	2.2	4.4	8.6	9.4	NP	.				-			L	N	2	3
14072	M	2.5	O	2.3	4.5	8.7	9.5	NP	.				-			L	N	2	2
14075	M	2.6	O	1.3	3.5	7.3	8.5	NP	.				-			L	N	2	2
14076	M	2.5	O	1.4	3.6	7.4	8.6	NP	.				-			L	N	2	2
14079	M	2.5	O	1.5	3.7	7.5	8.7	NP	.				-			L	N	2	2
14082	M	2.6	O	1.6	3.8	7.6	8.8	NP	.				-			L	N	2	2
14085	M	2.5	O	1.7	3.9	7.7	8.9	NP	.				-			L	N	2	2
14087	M	2.6	O	1.9	4.1	8.3	9.1	NP	.				-			L	N	2	2
14089	M	2.5	O	2	4.2	8.4	9.2	NP	.				-			L	N	2	2
14111	M	2.6	O	2.1	4.3	8.5	9.3	NP	.				-			L	N	2	2
14113	M	2.5	O	2.2	4.4	8.6	9.4	NP	.				-			L	N	2	2
14115	M	2.6	O	2.3	4.5	8.7	9.5	NP	.				-			L	N	2	2
14116	M	2.5	O	1.3	3.5	7.3	8.5	NP	.				-			L	N	2	2
14119	M	2.7	O	1.4	3.6	7.4	8.6	NP	.				-			N	N	2	2

14117	M	2.7	O	1.5	3.7	7.5	8.7	NP	.				-			N	N	2	2
14118	M	2.7	O	1.6	3.8	7.6	8.8	NP	.				-			N	N	2	2
14114	M	2.5	O	1.7	3.9	7.7	8.9	NP	.				-			N	N	2	2
14120	M	2.6	O	1.9	4.1	8.3	9.1	NP	.				-			N	N	2	2
14123	M	2.6	O	2	4.2	8.4	9.2	NP	.				-			N	N	2	2
14125	M	2.5	O	2.1	4.3	8.5	9.3	NP	.				-			N	N	2	2
14126	M	2.6	O	2.2	4.4	8.6	9.4	NP	.				-			N	N	2	2
14128	M	2.5	O	2.3	4.5	8.7	9.5	NP	.				-			N	N	2	2
14131	M	2.6	O	1.3	3.5	7.3	8.5	NP	.				-			N	N	2	2
14132	M	2.5	O	1.4	3.6	7.47	8.6	NP	.				-			N	N	2	2
14135	M	2.6	O	1.5	3.7	0.5	8.7	NP	.				-			N	N	2	2
14137	M	2.5	O	1.6	3.8	7.6	8.8	NP	.				-			N	N	2	2
14139	M	2.6	O	1.7	3.9	7.7	8.9	NP	.				-			N	N	2	2
14141	M	2.5	O	1.9	4.1	8.3	9.1	NP	.				-			N	N	2	2
14142	M	2.7	O	2	4.2	8.4	9.2	NP	.				-			N	N	2	2
14143	M	2.7	O	2.1	4.3	8.5	9.3	NP	.				-			N	N	2	2
14145	M	2.7	O	2.2	4.4	8.6	9.4	NP	.				-			N	N	2	2
14148	M	2.5	O	2.3	4.5	8.7	9.5	NP	.				-			N	N	2	2
14149	M	2.5	O	1.3	3.5	7.3	8.5	NP	.				-			N	N	2	2
14151	M	2.6	O	1.4	3.6	7.4	8.6	NP	.				-			N	N	2	2
14153	M	2.6	O	1.5	3.7	7.5	8.7	NP	.				-			N	N	2	2
14157	M	2.5	O	1.6	3.8	7.6	8.7	NP	.				-			L	N	2	2
14158	M	2.6	O	1.7	3.9	7.7	8.9	NP	.				-			L	N	2	2
14162	M	2.5	O	1.9	4.1	8.3	9.1	NP	.				-			L	N	2	2
14167	M	2.6	O	2	4.2	8.4	9.2	NP	.				-			L	N	2	2
14168	M	2.5	O	2.1	4.3	8.5	9.3	NP	.				-			L	N	2	2
14169	M	2.5	O	2.2	4.4	8.6	9.4	NP	.				-			N	N	2	2
14172	M	2.6	O	2.3	4.5	8.7	9.5	NP	.				-			N	N	2	2
14174	M	2.5	O	1.3	3.5	7.3	8.5	NP	.				-			N	N	2	2
14176	M	2.7	O	1.4	3.6	7.4	8.6	NP	.				-			N	N	2	2
14177	M	2.7	O	1.5	3.7	7.5	8.7	NP	.				-			N	N	2	2
14178	M	2.7	O	1.6	3.8	7.6	8.8	NP	.				-			N	N	2	2
14179	M	2.5	O	1.7	3.9	7.7	8.9	NP	.				-			N	N	2	2
14182	M	2.6	O	1.9	4.1	8.3	9.1	NP	.				-			N	N	2	2

14183	M	2.5	O	2	4.2	8.4	9.2	NP	.				-			N	N	2	2
14185	M	2.6	O	2.1	4.3	8.5	9.3	NP	.				-			N	N	2	2
14186	M	2.5	O	2.2	4.4	8.6	9.4	NP	.				-			L	N	2	2
14188	M	2.6	O	2.3	4.5	8.7	9.5	NP	.				-			L	N	2	2
14189	M	2.5	O	1.3	3.5	7.3	8.5	NP	.				-			L	N	2	2
14191	M	2.6	O	1.4	3.6	7.4	8.6	NP	.				-			L	N	2	2
14192	M	2.5	O	1.5	3.7	7.5	8.7	NP	.				-			L	N	2	2
14193	M	2.6	O	1.6	3.8	7.6	8.8	NP	.				-			L	N	2	2
14195	M	2.5	O	1.7	3.9	7.7	8.9	NP	.				-			L	N	2	2
14196	M	2.6	O	1.9	4.1	8.3	9.1	NP	.				-			L	N	2	2
14197	M	2.5	O	2	4.2	8.4	9.2	NP	.				-			L	N	2	2
14199	M	2.6	O	2.1	4.3	8.5	9.3	NP	.				-			L	N	2	2
14198	M	2.5	O	2.2	4.4	8.6	9.4	NP	.				-			N	N	2	2
14200	M	2.7	O	2.3	4.5	8.7	9.5	NP	.				-			N	N	2	2
14202	M	2.7	O	1.3	3.5	7.3	8.5	NP	.				-			N	N	2	2
14208	M	2.7	O	1.4	3.6	7.4	8.6	NP	.				-			N	N	2	2
14209	M	2.5	O	1.5	3.7	7.5	8.7	NP	.				-			N	N	2	2
14212	M	2.6	O	1.6	3.8	7.6	8.8	NP	.				-			N	N	2	2
14214	M	2.5	O	1.7	3.9	7.7	8.9	NP	.				-			N	N	2	2
14216	M	2.6	O	1.9	4.1	8.3	9.1	NP	.				-			N	N	2	2
14218	M	2.5	O	2	4.2	8.4	9.2	NP	.				-			N	N	2	2
14220	M	2.6	O	2.1	4.3	8.5	9.3	NP	.				-			N	N	2	2
14222	M	2.5	O	2.2	4.4	8.6	9.4	NP	.				-			N	N	2	2
14226	M	2.6	O	2.3	4.5	8.7	9.5	NP	.				-			N	N	2	2
14228	M	2.5	O	1.3	3.5	7.3	8.5	NP	.				-			N	N	2	2
14231	M	2.6	O	1.4	3.6	7.4	8.6	NP	.				-			N	N	2	2
14233	M	2.5	O	1.5	3.7	7.5	8.7	NP	.				-			N	N	2	2
14234	M	2.6	O	1.6	3.8	7.6	8.8	NP	.				-			N	N	2	2
14236	M	2.5	O	1.7	3.9	7.7	8.9	NP	.				-			N	N	2	2
14238	M	2.5	O	1.9	4.1	8.3	9.1	NP	.				-			N	N	2	2
14240	M	2.6	O	2	4.2	8.4	9.2	NP	.				-			N	N	2	2
14242	M	2.5	O	2.1	4.3	8.5	9.3	NP	.				-			N	N	2	2
14245	M	2.5	O	2.2	4.4	8.6	9.4	NP	.				-			L	N	2	2
14247	M	2.6	O	2.3	4.5	8.7	9.5	NP	.				-			L	N	2	2

14249	M	2.5	O	1.3	3.5	7.3	8.5	NP	.				-			L	N	2	2
14250	M	2.6	O	1.4	3.6	7.4	8.6	NP	.				-			L	N	2	2
14255	M	2.5	O	1.5	3.7	7.5	8.7	NP	.				-			L	N	2	2
14257	M	2.7	O	1.6	3.8	7.6	8.8	NP	.				-			L	N	2	2
14259	M	2.7	O	1.7	3.9	7.7	8.9	NP	.				-			L	N	2	2
14261	M	2.7	O	1.9	4.1	8.3	9.1	NP	.				-			L	N	2	2
14263	M	2.7	O	2	4.2	8.4	9.2	NP	.				-			L	N	2	2
14265	M	2.5	O	2.1	4.3	8.5	9.3	NP	.				-			L	N	2	2
14266	M	2.5	O	2.2	4.4	8.6	9.4	NP	.				-			L	N	2	2
14269	M	2.5	O	2.3	4.5	8.7	9.5	NP	.				-			L	N	2	2
14270	F	2.9	A	2.4	5.1	8	12	NP	.				-		N	L	H	1	3
14272	F	3.1	A	2.4	5.1	9	13	NP	.				-		N	N	H	1	3
14275	F	3.2	A	2.4	5.1	9	13	NP	.				-		N	N	H	1	3
14277	F	2.9	A	2.4	5.1	9	12	NP	.				-		N	N	H	1	3
14279	F	2.9	A	2.4	5.1	8	12	NP	.				-		N	N	H	1	3
14281	F	3.1	A	3.2	6.9	9	13	NP	.				-		N	L	H	1	3
14283	F	3.1	A	3.2	6.9	9	11	NP	.				-		N	L	H	1	3
14285	F	3.2	A	3.2	6.9	10	15	P	3	1			dct+	6%	N	L	H	1	3
14287	F	3.2	A	3.2	6.9	11	14	NP	.				-		N	AB	H	1	3
14289	F	2.5	A	3.2	6.9	14	16	P	2	2			dct+	8%	S+	L	H	1	2
14290	F	2.6	O	1.3	3.5	7.3	8.5	NP	.				-			N	N	2	2
14293	F	2.5	O	1.4	3.6	7.4	8.6	NP	.				-			N	N	2	2
14295	F	2.6	O	1.5	3.7	7.5	8.7	NP	.				-			N	N	2	2
14297	F	2.5	O	1.6	3.8	7.6	8.8	NP	.				-			N	N	2	2
14299	F	2.6	O	1.7	3.9	7.7	8.9	NP	.				-			N	N	2	2
14310	F	2.5	O	1.9	4.1	8.3	9.1	NP	.				-			N	N	2	2
14314	F	2.5	O	2	4.2	8.4	9.2	NP	.				-			N	N	2	2
14317	F	2.6	O	2.1	4.3	8.5	9.3	NP	.				-			N	N	2	2
14319	F	2.5	O	2.2	4.4	8.6	9.4	NP	.				-			N	N	2	2
14320	F	2.6	O	2.3	4.4	8.7	9.5	NP	.				-			N	N	2	2
14322	F	3.1	B	2.3	4	7	11	NP	.				-		N	N	H	1	3
14324	F	3.1	B	2.3	4	7	11	NP	.				-		N	N	H	1	3
14325	F	3.1	B	2.3	5.9	9	13	NP	.				-		N	N	H	1	3
14327	F	3.2	B	2.3	4	8	12	NP	.				-		N	N	H	1	3

14329	F	3.2	B	2.3	4	8	12	NP	.				-		N	N	H	1	3
14331	F	3.2	B	3.3	6.1	11.5	11	P	2	1			dct+	6%	N	L	H	1	3
14335	F	2.9	B	3.3	5	8.5	15	NP	.				-		N	AB	H	1	3
14339	F	2.9	B	3.3	11	10	14	P	1	2			dct+	8%	S+	L	H	1	3
14340	F	2.9	B	3.3	4	8	12	NP	.				-		N	L	H	1	3
3	F	2	B	3.4	12	14	16	P	1	2	21	done	dct+	7%	S+	L	H	1	3
5	F	2.5	O	1.3	3.5	7.3	8.5	NP	.				-			L	N	2	2
7	F	2.6	O	1.4	3.6	7.4	8.6	NP	.				-			L	N	2	2
8	F	2.5	O	1.5	3.7	7.5	8.7	NP	.				-			L	N	2	2
6	F	2.6	O	1.6	3.8	7.6	8.8	NP	.				-			L	N	2	2
9	F	2.7	O	1.7	3.9	7.7	8.9	NP	.				-			L	N	2	2
10	F	2.7	O	1.9	4.1	8.3	9.1	NP	.				-			L	N	2	2
11	F	2.7	O	2	4.2	8.4	9.2	NP	.				-			L	N	2	2
13	F	2.5	O	2.1	4.3	8.5	9.3	NP	.				-			L	N	2	2
15	F	2.6	O	2.2	4.4	8.6	9.4	NP	.				-			L	N	2	2
16	F	2.6	O	2.3	4.5	8.7	9.5	NP	.				-			L	N	2	2
17	F	2.5	A	2.5	4	8	12	NP	.				-		N	L	H	1	2
19	F	2.9	A	2.5	4	8	12	NP	.				-		N	L	H	1	3
21	F	2.9	A	2.5	5.3	9	13	NP	.				-		NN	L	H	1	3
23	F	3.1	A	2.5	5.3	9	13	NP	.				-		N	L	H	1	3
24	F	3.1	A	2.5	5.3	9	13	NP	.				-		N	L	H	1	3
25	F	3.1	A	3.1	6.7	9	13	NP	.				-		N	N	H	1	3
27	F	3.2	A	3.1	6.7	9	13	NP	.				-		N	N	H	1	3
29	F	3.2	B	3.1	6.7	9	12	NP	.				-		N	N	H	1	3
30	F	3.2	B	3.1	5	8	12	NP	.				-		N	AB	H	1	3
32	F	3.1	B	3.1	11	12	16	P	1	2			dct+	8%	S+	N	H	1	3
33	F	2.5	O	1.3	3.5	7.3	8.5	NP	.				-			L	N	2	2
35	F	2.6	O	1.4	3.6	7.4	8.6	NP	.				-			L	N	2	2
37	F	2.5	O	1.5	3.7	7.5	8.7	NP	.				-			L	N	2	2
39	F	2.6	O	1.6	3.8	7.6	8.8	NP	.				-			L	N	2	2
41	F	2.5	O	1.7	3.9	7.7	8.9	NP	.				-			L	N	2	2
43	F	2.6	O	1.9	4.1	8.3	9.1	NP	.				-			AB	N	2	2
45	F	2.5	O	2	4.2	8.4	9.2	NP	.				-			L	N	2	2
47	F	2.7	O	2.1	4.3	8.5	9.3	NP	.				-			L	N	2	2

49	F	2.7	O	2.2	4.4	8.6	9.4	NP	.				-			L	N	2	2
50	F	2.7	O	2.3	4.5	8.7	9.5	NP	.				-			L	N	2	2
51	F	2.5	A	2.8	5.4	7	11	NP	.				-		N	L	H	1	2
52	F	2.6	AB	2.8	5.4	9	13	NP	.				-		N	L	H	1	2
54	F	2.5	AB	2.8	6.6	8	11	NP	.				-		N	N	H	1	2
56	F	2.6	A	2.8	6.6	9	13	NP	.				-		N	N	H	1	2
58	F	2.5	O	1.3	3.5	7.3	8.5	NP	.				-			N	N	2	2
59	F	2.6	O	1.4	3.6	7.4	8.6	NP	.				-			N	N	2	2
61	F	2.6	O	1.5	3.7	7.5	8.7	NP	.				-			N	N	2	2
62	F	2.5	O	1.6	3.8	7.6	8.8	NP	.				-			N	N	2	2
64	F	2.5	O	1.7	3.9	7.7	8.9	NP	.				-			N	N	2	2
68	F	2.6	O	1.9	4.1	8.3	9.1	NP	.				-			N	N	2	2
69	F	2.6	O	2	4.2	8.4	9.2	NP	.				-			N	N	2	2
71	F	2.5	O	2.1	4.3	8.5	9.3	NP	.				-			N	N	2	2
72	F	2.6	O	2.2	4.4	8.6	9.4	NP	.				-			N	N	2	2
73	F	2.5	O	2.3	4.5	8.7	9.5	NP	.				-			L	N	2	2
74	F	2.6	O	1.3	3.5	7.3	8.5	NP	.				-			L	N	2	2
76	F	2.5	O	1.4	3.6	7.4	8.6	NP	.				-			L	N	2	2
78	F	2.6	O	1.5	3.7	7.5	8.7	NP	.				-			L	N	2	2
79	F	2.5	O	1.6	3.8	7.6	8.8	NP	.				-			L	N	2	2
80	F	2.6	O	1.7	3.9	7.7	8.9	NP	.				-			L	N	2	2
83	F	2.5	O	1.9	4.1	8.3	9.1	NP	.				-			L	N	2	2
84	F	2.5	O	2	4.2	8.4	9.2	NP	.				-			L	N	2	2
85	F	2.5	O	2.1	4.3	8.5	9.3	NP	.				-			L	N	2	2
86	F	2.6	O	2.2	4.4	8.6	9.4	NP	.				-			L	N	2	2
89	F	2.5	O	2.3	4.5	8.7	9.5	NP	.				-			L	N	2	2
91	F	2.6	O	1.3	3.5	7.3	8.5	NP	.				-			N	N	2	2
93	F	2.5	O	1.4	3.6	7.4	8.6	NP	.				-			AB	N	2	2
95	F	2.5	O	1.5	3.7	7.5	8.7	NP	.				-			N	N	2	2
96	F	2.6	O	1.6	3.8	7.6	8.8	NP	.				-			N	N	2	2
97	F	2.5	O	1.7	3.9	7.7	8.9	NP	.				-			L	N	2	2
98	F	2.6	O	1.9	4.1	8.3	9.1	NP	.				-			L	N	2	2
101	F	2.5	O	2	4.2	8.4	9.2	NP	.				-			L	N	2	2
103	F	2.6	O	2.1	4.3	8.5	9.3	NP	.				-			L	N	2	2

105	F	2.5	O	2.2	4.4	8.6	9.4	NP	.				-			L	N	2	2
106	F	2.6	O	2.3	4.5	8.7	9.5	NP	.				-			L	N	2	2
107	F	2.5	O	1.3	3.5	7.3	8.5	NP	.				-			L	N	2	2
109	F	2.7	O	1.4	3.6	7.4	8.6	NP	.				-			L	N	2	2
111	F	2.7	O	1.5	3.7	7.5	8.7	NP	.				-			L	N	2	2
112	F	2.7	O	1.6	3.8	7.6	8.8	NP	.				-			L	N	2	2
113	F	2.7	O	1.7	3.9	7.7	8.9	NP	.				-			L	N	2	2
116	F	2.5	O	1.9	4.1	8.3	9.1	NP	.				-			N	N	2	2
120	F	2.6	O	2	4.2	8.4	9.2	NP	.				-			N	N	2	2
124	F	2.5	O	2.1	4.3	8.5	9.3	NP	.				-			N	N	2	2
128	F	2.6	O	2.2	4.4	8.6	9.4	NP	.				-			N	N	2	2
131	F	2.5	O	2.3	4.5	8.7	9.5	NP	.				-			N	N	2	2
135	F	2.5	O	1.3	3.5	7.3	8.5	NP	.				-			AB	N	2	2
145	F	2.6	O	1.4	3.6	7.4	8.6	NP	.				-			N	N	2	2
149	F	2.5	O	1.5	3.7	7.5	8.7	NP	.				-			N	N	2	2
158	F	3	O	1.6	3.8	7.6	8.8	NP	.				-			N	N	2	3
165	F	3.1	O	1.7	3.9	7.7	8.9	NP	.				-			L	N	2	3
168	F	3.2	O	1.9	4.1	8.3	9.1	NP	.				-			L	N	2	3
175	F	3.1	O	2	4.2	8.4	9.2	NP	.				-			L	N	2	3
179	F	3	O	2.1	4.3	8.5	9.3	NP	.				-			L	N	2	3
185	F	3.2	O	2.2	4.4	8.6	9.4	NP	.				-			L	N	2	3
189	F	3.2	O	2.3	4.5	8.7	9.5	NP	.				-			L	N	2	3
195	F	3.1	O	1.3	3.5	7.3	8.5	NP	.				-			L	N	2	3
201	F	3.2	O	1.4	3.6	7.4	8.6	NP	.				-			L	N	2	3
245	F	3.1	O	1.5	3.7	7.5	8.7	NP	.				-			L	N	2	3
256	F	3.2	O	1.8	3.8	7.6	8.8	NP	.				-			L	N	2	3
265	F	3.2	O	2.1	3.9	7.7	8.9	NP	.				-			N	N	2	3
276	F	3.2	O	2.2	4.1	8.3	9.1	NP	.				-			N	N	2	3
284	F	3.2	O	2.3	4.2	8.4	9.2	NP	.				-			N	N	2	3
296	F	3.2	O	1.3	4.3	8.5	9.3	NP	.				-			N	N	2	3
301	F	3.1	O	1.4	4.4	8.6	9.4	NP	.				-			N	N	2	3
318	F	3.2	O	1.5	4.5	8.7	9.5	NP	.				-			N	N	2	3
329	F	3.2	O	1.6	3.5	7.3	8.5	NP	.				-			N	N	2	3
334	F	3.2	O	1.7	3.6	7.4	8.6	NP	.				-			N	N	2	3

349	F	3.2	O	1.8	4	8	9	NP	.				-			N	N	2	3
357	F	3.1	O	1.9	3.7	7.5	8.7	NP	.				-			N	N	2	3
368	F	3.1	O	2	4.3	8.5	9.3	NP	.				-			AB	N	2	3
374	F	3.1	O	2.1	4.4	8.6	9.4	NP	.				-			L	N	2	3
384	F	3	O	2.2	4.5	8.7	9.5	NP	.				-			L	N	2	3
394	F	3	O	2.3	4	8	9	NP	.				-			L	N	2	3
401	F	3	O	1.3	3.5	7.3	8.5	NP	.				-			L	N	2	3
416	F	3.1	O	1.4	3.6	7.4	8.6	NP	.				-			L	N	2	3
586	F	3.2	O	1.5	3.7	7.5	8.7	NP	.				-			L	N	2	3
694	F	3.1	O	1.6	3.8	7.6	8.8	NP	.				-			L	N	2	3
787	F	3	O	1.7	3.9	7.7	8.9	NP	.				-			L	N	2	3
894	F	2	O	1.8	4.1	8.3	9.1	NP	.				-			L	N	2	1
999	F	2.1	O	1.9	4.2	8.4	9.2	NP	.				-			L	N	2	1
1091	F	2.1	O	2.1	4.3	8.5	9.3	NP	.				-			N	N	2	1
1152	F	2	O	2.2	4.4	8.6	9.4	NP	.				-			N	N	2	1
1247	F	2.2	O	2.3	4.5	8.7	9.5	NP	.				-			N	N	2	1
1482	F	2	O	1.3	3.5	7.3	8.5	NP	.				-			N	N	2	1
1698	F	2	B	1.4	3.6	7.4	8.6	NP	.				-			N	N	1	1
1762	F	2.2	B	1.5	3.7	7.5	8.7	NP	.				-			N	N	1	1
1985	F	2	B	1.6	3.8	7.6	8.8	NP	.				-			N	N	1	1
2165	F	2	B	1.7	3.9	7.7	8.9	NP	.				-			N	N	1	1
2354	F	3.4	B	1.8	4	8	9	NP	.				-			N	N	1	4
2468	F	3.5	B	1.9	4.1	8.3	9.5	NP	.				-			N	N	1	4
2568	F	3.6	B	2	4.2	8.4	9.1	NP	.				-			L	N	1	4
2589	F	3	B	2.1	4.3	8.5	9.2	NP	.				-			L	N	1	3
2785	F	3.7	B	2.2	4.4	8.6	9.3	NP	.				-			L	N	1	4
2791	F	4	B	2.3	4.5	8.7	9.4	NP	.				-			L	N	1	4
2798	F	3.5	B	1.3	3.5	7.3	8.5	NP	.				-			L	N	1	4
2831	F	3.6	B	1.4	3.6	7.4	8.6	NP	.				-			L	N	1	4
2851	F	3.9	B	1.5	3.7	7.5	8.7	NP	.				-			L	N	1	4
2894	F	35	B	1.6	3.8	7.6	8.8	NP	.				-			L	N	1	4
2914	F	2.5	B	1.7	3.9	7.7	8.9	NP	.				-			L	N	1	2
2935	F	2.6	B	1.8	4	8	9	NP	.				-			N	N	1	2
2975	F	2.5	B	1.9	4.1	8.3	9.1	NP	.				-			N	N	1	2

2999	F	2.6	B	2	4.2	8.4	9.2	NP	.				-			N	N	1	2
3016	F	2.7	B	2.1	4.3	8.5	9.3	NP	.				-			N	N	1	2
3056	F	2.7	B	2.2	4.4	8.6	9.4	NP	.				-			N	N	1	2
3089	F	2.7	B	2.3	4.5	8.7	9.5	NP	.				-			N	N	1	2
3126	F	2.7	B	1.3	3.5	7.3	8.5	NP	.				-			N	N	1	2
3148	F	2.7	B	1.4	3.6	7.4	8.6	NP	.				-			N	N	1	2
3179	F	2.5	B	1.5	3.7	7.5	8.7	NP	.				-			N	N	1	2
3245	F	2.6	B	1.6	3.8	7.6	8.8	NP	.				-			N	N	1	2
3289	F	2.6	B	1.7	3.9	7.7	8.9	NP	.				-			N	N	1	2
3352	F	2.6	B	1.8	4	8	9	NP	.				-			L	N	1	2
3457	F	2.6	B	1.9	4.1	8.3	9.1	NP	.				-			L	N	1	2
3564	F	2.6	B	2	4.2	8.4	9.2	NP	.				-			L	N	1	2
3624	F	2.6	B	2.1	4.3	8.5	9.3	NP	.				-			L	N	1	2
3789	F	2.6	B	2.2	4.4	8.6	9.4	NP	.				-			AB	N	1	2
3841	F	2.5	B	2.3	4.5	8.7	9.5	NP	.				-			L	N	1	2
3962	F	2.5	B	1.3	3.5	7.3	8.5	NP	.				-			L	N	1	2
4035	F	2.5	B	1.4	3.6	7.4	8.6	NP	.				-			L	N	1	2
4132	F	2.5	B	1.5	3.7	7.5	8.7	NP	.				-			L	N	1	2
4265	F	2.5	B	1.6	3.8	7.6	8.8	NP	.				-			L	N	1	2
4351	F	2.5	B	1.7	3.9	7.7	8.9	NP	.				-			L	N	1	2
4451	F	2.6	B	1.8	4	8	9	NP	.				-			L	N	1	2
4512	F	2.6	B	1.9	4.1	8.3	9.1	NP	.				-			L	N	1	2
4621	F	2.6	B	2	4.2	8.4	9.2	NP	.				-			L	N	1	2
4785	F	2.5	B	2.1	4.3	8.5	9.3	NP	.				-			L	N	1	2
4857	F	2.5	B	2.2	4.4	8.6	9.4	NP	.				-			L	N	1	2
4987	F	2.5	B	2.3	4.5	8.7	9.5	NP	.				-			L	N	1	2
5246	F	2.5	B	1.3	3.5	7.3	8.5	NP	.				-			L	N	1	2
5468	F	2.5	B	1.4	3.6	7.4	8.6	NP	.				-			L	N	1	2
5698	F	2.5	B	1.5	3.7	7.5	8.7	NP	.				-			N	N	1	2
5862	F	2.6	B	1.6	3.8	7.6	8.8	NP	.				-			N	N	1	2
6143	F	2.6	B	1.7	3.9	7.7	8.9	NP	.				-			N	N	1	2
6354	F	2.6	B	1.8	4	8	9	NP	.				-			N	N	1	2
6345	F	2.6	B	1.9	4.1	8.3	9.1	NP	.				-			N	N	1	2
6478	F	2.5	B	2	4.2	8.4	9.2	NP	.				-			N	N	1	2

6524	F	2.5	B	2.1	4.3	8.5	9.3	NP	.				-			N	N	1	2
6621	F	2.5	B	2.2	4.4	8.6	9.4	NP	.				-			N	N	1	2
6789	F	2.6	B	2.3	4.5	8.7	9.5	NP	.				-			N	N	1	2
6842	F	2.5	B	1.3	3.5	7.3	8.5	NP	.				-			N	N	1	2
6954	F	2.6	B	1.4	3.6	7.4	8.6	NP	.				-			N	N	1	2
7012	F	2.5	B	1.5	3.7	7.5	8.7	NP	.				-			N	N	1	2
7034	F	2.6	B	1.6	3.8	7.6	8.8	NP	.				-			N	N	1	2
7064	F	3	B	1.7	3.9	7.7	8.9	NP	.				-			N	N	1	3
7089	F	3.2	B	1.8	4	8	9	NP	.				-			N	N	1	3
7215	F	3.1	B	1.9	4.1	8.3	9.1	NP	.				-			N	N	1	3
7354	F	3.2	B	2	4.2	8.4	9.2	NP	.				-			N	N	1	3
7267	F	3.1	B	2.1	4.3	8.5	9.3	NP	.				-			N	N	1	3
7389	F	3	B	2.2	4.4	8.6	9.4	NP	.				-			N	N	1	3
7359	F	3.1	B	2.3	4.5	8.7	9.5	NP	.				-			N	N	1	3
7489	F	3.2	B	1.3	3.5	7.3	8.5	NP	.				-			L	N	1	3
7491	F	3.1	B	1.4	3.6	7.4	8.6	NP	.				-			L	N	1	3
7513	F	3.2	B	1.5	3.7	7.5	8.7	NP	.				-			L	N	1	3
7548	F	3.2	B	1.6	3.8	7.6	8.8	NP	.				-			L	N	1	3
7684	F	3.1	B	1.7	3.9	7.7	8.9	NP	.				-			L	N	1	3
7789	F	3.2	B	1.8	4	8	9	NP	.				-			L	N	1	3
7894	F	3.1	B	1.9	4.1	8.3	9.1	NP	.				-			L	N	1	3
7921	F	3.1	B	2	4.2	8.4	9.2	NP	.				-			L	N	1	3
8123	F	3.1	B	2.1	4.3	8.5	9.3	NP	.				-			L	N	1	3
8236	F	3.1	B	2.2	4.4	8.6	9.4	NP	.				-			L	N	1	3
8345	F	3	B	2.3	4.5	8.7	9.5	NP	.				-			N	N	1	3
8465	F	3.2	B	1.3	3.5	7.3	8.5	NP	.				-			N	N	1	3
8513	F	3	B	1.4	3.6	7.4	8.6	NP	.				-			N	N	1	3
8624	F	3	B	1.5	3.7	7.5	8.7	NP	.				-			N	N	1	3
8792	F	3	B	1.6	3.8	7.6	8.8	NP	.				-			N	N	1	3
8813	F	3	B	1.7	3.9	7.7	8.9	NP	.				-			N	N	1	3
8954	F	3	B	1.8	4	8	9	NP	.				-			N	N	1	3
9014	F	3	B	1.9	4.1	8.3	9.1	NP	.				-			N	N	1	3
9023	F	3.1	B	2	4.2	8.4	9.2	NP	.				-			N	N	1	3
9046	F	3.1	B	2.1	4.3	8.5	9.3	NP	.				-			N	N	1	3

9056	F	3.2	B	2.2	4.4	8.6	9.4	NP	.				-			N	N	1	3
9075	F	3.2	B	2.3	4.5	8.7	9.5	NP	.				-			L	N	1	3
9078	F	3.1	B	1.3	3.5	7.3	8.5	NP	.				-			L	N	1	3
9081	F	3.2	B	1.4	3.6	7.4	8.6	NP	.				-			L	N	1	3
9086	F	3.1	B	1.5	3.7	7.5	8.7	NP	.				-			L	N	1	3
9090	F	3.2	B	1.6	3.8	7.6	8.8	NP	.				-			AB	N	1	3
9098	F	3.2	B	1.7	3.9	7.7	8.9	NP	.				-			L	N	1	3
9123	F	3.1	B	1.9	4.1	8.3	9.1	NP	.				-			L	N	1	3
9145	F	3.2	B	2	4.2	8.4	9.2	NP	.				-			L	N	1	3
9178	F	3.6	B	2.1	4.3	8.5	9.3	NP	.				-			L	N	1	4
9189	F	3.5	B	2.2	4.4	8.6	9.4	NP	.				-			L	N	1	4
9347	F	3.8	B	2.3	4.5	8.7	9.5	NP	.				-			L	N	1	4
9357	F	3.6	B	1.3	3.5	7.3	8.5	NP	.				-			N	N	1	4
9367	F	3.9	B	1.4	3.6	7.4	8.6	NP	.				-			N	N	1	4
9384	F	4	B	1.5	3.7	7.5	8.7	NP	.				-			N	N	1	4
9391	F	3.7	B	1.6	3.8	7.6	8.8	NP	.				-			N	N	1	4
9412	F	3.6	B	1.7	3.9	7.7	8.9	NP	.				-			N	N	1	4
9435	F	3.6	B	1.9	4.1	8.3	9.1	NP	.				-			N	N	1	4
9456	F	3.6	B	2	4.2	8.4	9.2	NP	.				-			N	N	1	4
9467	F	3.6	B	2.1	4.3	8.5	9.3	NP	.				-			N	N	1	4
9478	F	3.5	B	2.2	4.4	8.6	9.4	NP	.				-			N	N	1	4
9489	F	3	B	2.3	4.5	8.7	9.5	NP	.				-			N	N	1	3
9491	F	3	B	1.3	3.5	7.3	8.5	NP	.				-			N	N	1	3
9499	F	3	A	1.4	3.6	7.4	8.6	NP	.				-			N	N	1	3
9511	F	3	A	1.5	3.7	7.5	8.7	NP	.				-			N	N	1	3
9521	F	3	A	1.6	3.8	7.6	8.8	NP	.				-			N	N	1	3
9524	F	3.1	A	1.7	3.9	7.7	8.9	NP	.				-			N	N	1	3
9526	F	3	A	1.9	4.1	8.3	9.1	NP	.				-			N	N	1	3
9567	F	3	A	2	4.2	8.4	9.2	NP	.				-			N	N	1	3
9578	F	3	A	2.1	4.3	8.5	9.3	NP	.				-			N	N	1	3
9589	F	3	A	2.2	4.4	8.6	9.4	NP	.				-			N	N	1	3
9591	F	3.1	A	2.3	4.5	8.7	9.5	NP	.				-			N	N	1	3
9612	F	3	A	1.3	3.5	7.3	8.5	NP	.				-			N	N	1	3
9623	F	3	A	1.4	3.6	7.4	8.6	NP	.				-			L	N	1	3

9634	F	3.2	A	1.5	3.7	7.5	8.7	NP	.				-			L	N	1	3
9645	F	3	A	1.6	3.8	7.6	8.8	NP	.				-			N	N	1	3
9656	F	3	A	1.7	3.9	7.7	8.9	NP	.				-			N	N	1	3
9667	F	3	A	1.9	4.1	8.3	9.1	NP	.				-			N	N	1	3
9678	F	3	A	2	4.2	8.4	9.2	NP	.				-			N	N	1	3
9689	F	3	A	2.1	4.3	8.5	9.3	NP	.				-			N	N	1	3
9692	F	2.5	A	2.2	4.4	8.6	9.4	NP	.				-			L	N	1	2
9712	F	2.6	A	2.3	4.5	8.7	9.5	NP	.				-			L	N	1	2
9718	F	2.5	A	1.3	3.5	7.3	8.5	NP	.				-			L	N	1	2
9719	F	2.6	A	1.4	3.6	7.4	8.6	NP	.				-			L	N	1	2
9721	F	2.5	A	1.5	3.7	7.5	8.7	NP	.				-			L	N	1	2
9724	F	2.6	A	1.6	3.8	7.6	8.8	NP	.				-			L	N	1	2
9726	F	2.5	A	1.7	3.9	7.7	8.9	NP	.				-			L	N	1	2
9777	F	2.6	A	1.9	4.1	8.3	9.1	NP	.				-			L	N	1	2
9789	F	2.5	A	2	4.2	8.4	9.2	NP	.				-			L	N	1	2
9791	F	2.7	A	2.1	4.3	8.5	9.3	NP	.				-			L	N	1	2
9799	F	2.6	A	2.2	4.4	8.6	9.4	NP	.				-			L	N	1	2
9841	F	2.5	A	2.3	4.5	8.7	9.5	NP	.				-			L	N	1	2
9851	F	2.6	A	1.3	3.5	7.3	8.5	NP	.				-			L	N	1	2
9854	F	2.6	A	1.4	3.6	7.4	8.6	NP	.				-			L	N	1	2
9857	F	2.7	A	1.5	3.7	7.5	8.7	NP	.				-			L	N	1	2
9876	F	2.5	A	1.6	3.8	7.6	8.8	NP	.				-			L	N	1	2
9879	F	2.6	A	1.7	3.9	7.7	8.9	NP	.				-			L	N	1	2
9888	F	2.5	A	1.9	4.1	8.3	9.1	NP	.				-			L	N	1	2
9891	F	2.6	A	2	4.2	8.4	9.2	NP	.				-			L	N	1	2
9912	F	2.7	A	2.1	4.3	8.5	9.3	NP	.				-			L	N	1	2
9975	F	2.9	A	2.2	4.4	8.6	9.4	NP	.				-			L	N	1	3
9991	F	2.9	A	2.3	4.5	8.7	9.5	NP	.				-			L	N	1	3
10121	F	2.9	A	1.3	3.5	7.3	8.5	NP	.				-			L	N	1	3
10241	F	3	A	1.4	3.6	7.4	8.6	NP	.				-			L	N	1	3
10246	F	3	A	1.5	3.7	7.5	8.7	NP	.				-			L	N	1	3
10256	F	3	A	1.6	3.8	7.6	8.8	NP	.				-			L	N	1	3
10267	F	3.1	A	1.7	3.9	7.7	8.9	NP	.				-			L	N	1	3
10274	F	3.1	A	1.9	4.1	8.3	9.1	NP	.				-			L	N	1	3

10280	F	3.1	A	2	4.2	8.4	9.2	NP	.				-			L	N	1	3
10291	F	3	A	2.1	4.3	8.5	9.3	NP	.				-			L	N	1	3
10301	F	2.9	A	2.2	4.4	8.6	9.4	NP	.				-			L	N	1	3
10312	F	2.9	A	2.3	4.5	8.7	9.5	NP	.				-			N	N	1	3
10323	F	2.9	A	1.3	3.5	7.3	8.5	NP	.				-			N	N	1	3
10334	F	3	A	1.4	3.6	7.4	8.6	NP	.				-			N	N	1	3
10345	F	3	A	1.5	3.7	7.5	8.7	NP	.				-			N	N	1	3
10356	F	3	A	1.6	3.8	7.6	8.8	NP	.				-			N	N	1	3
10367	F	3.1	A	1.7	3.9	7.7	8.9	NP	.				-			N	N	1	3
10378	F	3.1	A	1.9	4.1	8.3	9.1	NP	.				-			N	N	1	3
10389	F	3.1	A	2	4.2	8.4	9.2	NP	.				-			N	N	1	3
10397	F	3.1	A	2.1	4.3	8.5	9.3	NP	.				-			N	N	1	3
10399	F	2.5	A	2.2	4.4	8.6	9.4	NP	.				-			N	N	1	2
10401	F	2.6	A	2.3	4.5	8.7	9.5	NP	.				-			N	N	1	2
10409	F	2.5	A	1.3	3.5	7.3	8.5	NP	.				-			N	N	1	2
10411	F	2.7	A	1.4	3.6	7.4	8.6	NP	.				-			N	N	1	2
10413	F	2.6	A	1.5	3.7	7.5	8.7	NP	.				-			N	N	1	2
10415	F	2.6	A	1.6	3.8	7.6	8.8	NP	.				-			N	N	1	2
10425	F	2.7	A	1.7	3.9	7.7	8.9	NP	.				-			N	N	1	2
10434	F	2.6	A	1.9	4.1	8.3	9.1	NP	.				-			N	N	1	2
10436	F	2.5	A	2	4.2	8.4	9.2	NP	.				-			N	N	1	2
10438	F	2.6	A	2.1	4.3	8.5	9.3	NP	.				-			N	N	1	2
10345	F	2.5	A	2.2	4.4	8.6	9.4	NP	.				-			N	N	1	2
10439	F	2.6	A	2.3	4.5	8.7	9.5	NP	.				-			N	N	1	2
10441	F	2.5	A	1.3	3.5	7.3	8.5	NP	.				-			N	N	1	2
10443	F	2.7	A	1.4	3.6	7.4	8.6	NP	.				-			N	N	1	2
10445	F	2.7	A	1.5	3.7	7.5	8.7	NP	.				-			N	N	1	2
10447	F	2.5	A	1.6	3.8	7.6	8.8	NP	.				-			N	N	1	2
10449	F	2.6	A	1.7	3.9	7.7	8.9	NP	.				-			N	N	1	2
10450	F	2.5	A	1.9	4.1	8.3	9.1	NP	.				-			N	N	1	2
10461	F	2.6	A	2	4.2	8.4	9.2	NP	.				-			N	N	1	2
10463	F	2.5	A	2.1	4.3	8.5	9.3	NP	.				-			N	N	1	2
10465	F	2.9	A	2.2	4.4	8.6	9.4	NP	.				-			N	N	1	3
10467	F	3	A	2.3	4.5	8.7	9.5	NP	.				-			N	N	1	3
10469	F	3.1	A	1.3	3.5	7.3	8.5	NP	.				-			L	N	1	3
10471	F	3.2	A	1.4	3.6	7.4	8.6	NP	.				-			L	N	1	3
10473	F	3	A	1.5	3.7	7.5	8.7	NP	.				-			L	N	1	3
10475	F	3.2	A	1.6	3.8	7.6	8.8	NP	.				-			L	N	1	3
10476	F	3.2	A	1.7	3.9	7.7	8.9	NP	.				-			L	N	1	3
10477	F	3.1	A	1.9	4.1	8.3	9.1	NP	.				-			L	N	1	3
10479	F	3	A	2	4.2	8.4	9.2	NP	.				-			L	N	1	3
10480	F	3.1	A	2.1	4.3	8.5	9.3	NP	.				-			L	N	1	3
10481	F	3.2	A	2.2	4.4	8.6	9.4	NP	.				-			L	N	1	3
10482	F	3	A	2.3	4.5	8.7	9.5	NP	.				-			L	N	1	3
10483	F	3	A	1.3	3.5	7.3	8.5	NP	.				-			L	N	1	3
10484	F	3	A	1.4	3.6	7.4	8.6	NP	.				-			L	N	1	3
10485	F	3.2	A	1.5	3.7	7.5	8.7	NP	.				-			L	N	1	3

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10486	F	3	A	1.6	3.8	7.6	8.8	NP	.				-			L	N	1	3
10489	F	3.1	A	1.7	3.9	7.7	8.9	NP	.				-			L	N	1	3
10491	F	3	A	1.9	4.1	8.3	9.1	NP	.				-			L	N	1	3
10492	F	3.1	A	2	4.2	8.4	9.2	NP	.				-			L	N	1	3
10493	F	3.2	A	2.1	4.3	8.5	9.3	NP	.				-			N	N	1	3
10494	F	3.1	A	2.2	4.4	8.6	9.4	NP	.				-			N	N	1	3
10496	F	3.1	A	2.3	4.5	8.7	9.5	NP	.				-			N	N	1	3
10497	F	3.2	A	1.3	3.5	7.3	8.5	NP	.				-			N	N	1	3
10498	F	3.2	A	1.4	3.6	7.4	8.6	NP	.				-			N	N	1	3
10499	F	3	A	1.5	3.7	7.5	8.7	NP	.				-			N	N	1	3
10501	F	3	A	1.6	3.8	7.6	8.8	NP	.				-			N	N	1	3
10503	F	3	A	1.7	3.9	7.7	8.9	NP	.				-			N	N	1	3
10504	F	3	A	1.9	4.1	8.3	9.1	NP	.				-			N	N	1	3
10506	F	3	A	2	4.2	8.4	9.2	NP	.				-			N	N	1	3
10507	F	3.2	A	2.1	4.3	8.5	9.3	NP	.				-			N	N	1	3
10511	F	3.2	A	2.2	4.4	8.6	9.4	NP	.				-			L	N	1	3
10513	F	3.1	A	2.3	4.5	8.7	9.5	NP	.				-			L	N	1	3
10518	F	3.2	A	1.3	3.5	7.3	8.5	NP	.				-			L	N	1	3
10520	F	3.2	A	1.4	3.6	7.4	8.6	NP	.				-			L	N	1	3
10521	F	3	A	1.5	3.7	7.5	8.7	NP	.				-			L	N	1	3
10523	F	3.2	A	1.6	3.8	7.6	8.8	NP	.				-			L	N	1	3
10524	F	3.1	A	1.7	3.9	7.7	8.9	NP	.				-			L	N	1	3
10530	F	3.1	A	1.9	4.1	8.3	9.1	NP	.				-			L	N	1	3
10533	F	3.2	A	2	4.2	8.4	9.2	NP	.				-			L	N	1	3
10536	F	3.2	A	2.1	4.3	8.5	9.3	NP	.				-			L	N	1	3
10538	F	3	A	2.2	4.4	8.6	9.4	NP	.				-			L	N	1	3