بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

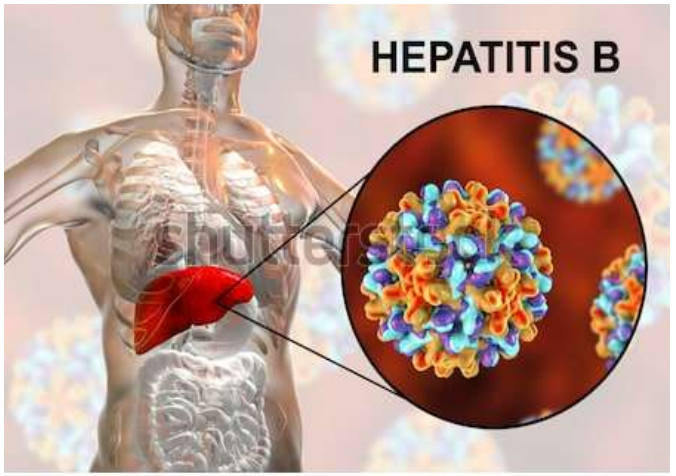
L XIII

Viral Hepatitis 2

~~HAV.~~

HBV, HCV. HDV HEV and HGV

14-12-2023



HEPATITIS B

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14 Dec.. 2023

HEPATITIS B

- **Hepatitis B (formerly known as "serum" hepatitis**
- Hepatitis B is a global public health threat and the world's most common serious liver infection.
  - It is up to **100 times more** infectious than the **HIV/AIDS virus**.
  - It also is the primary cause of liver cancer (**hepatocellular carcinoma (HCC)**), which is the **second-leading cause of cancer deaths** in the world.
    - **It is a major global health problem, & the most serious type of viral hepatitis.**
- **However, it can be prevented by currently available safe and effective vaccine.**
- **Clinically it is** characterized **by variety of outcomes**.
  - Usually, it is an **acute self-limiting infection**, which may be either
    - **Subclinical** or **Symptomatic**.
- Roughly 70 %of an acute HBV infection have symptoms

❖ **Chronic HBV infection.**

- around 5% of adults,
- 30 % of children, and roughly
- 95% of early childhood and infants exposed at birth

will not clear the virus and will develop a chronic HBV infection

❖ These people are considered carriers since the virus remains in their blood

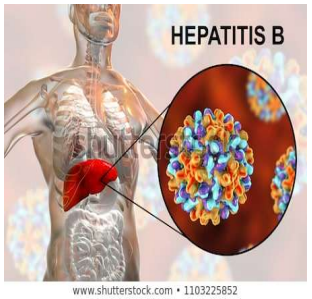
- ❖ In approximately 5 to 15 % of cases, HBV infection fails
- ❖ to resolve and become persistent carriers of the virus

➢ **Persistent** HBV infection may cause **progressive liver disease** including **chronic active hepatitis** and **HCC**.

❑ HBV can **form a dangerous alliance with Delta Virus** and

❖ produce a **new form of virulent hepatitis** which is considered to be a widespread threat for much of the world.

Geographical Distribution



- **Hepatitis B is a major global** health problem, and
  - the most **serious type of viral hepatitis**.
- **More than 2 Billion people WW have evidence(one out of three people) of past or current HBV infection** and
- Approximately**1.5 million** people become newly infected **each year**
- Almost **300 million** people are **chronically infected**
- Approximately **10%** of infected individuals **are diagnosed**
- Approximately **two people** die **each minute** from hepatitis B
- **HBV is the leading cause of liver cirrhosis** & **HCC** WW
- The virus **causes 60-80% of all primary liver cancer.**
  - **Between 5-15 % of adults, and**
  - **up to 95 %of infants infected with HBV become carriers**

Among these,

25%, in the long term, develop serious liver disease

About1/2million deaths/year are due to advanced chronic hepatitis, and 340000 are due to (HCC

Cont. …Geographical Distribution

The burden of hepatitis B infection is highest in the

- WHO **Western Pacific Region(**116 million **)**
- **WHO African Region, (**81 million) people, are chronically infected.
- WHO **Eastern Mediterranean Region Sixty million** people are infected
- WHO **South-East Asia Region, 18 million**
- WHO **European Region 14 million** and
- WHO **Region of the Americas 5 million**

- **Hepatitis B is Endemic throughout the world**, especially **in**
  - **Tropical& Developing countries** &also in some **regions of Europe**
- Its **prevalence varies from country to country** and
  - **depends upon a complex mix of Behavioural, Environmental and Host Factors**
- **In general it is lowest in countries or areas with high standards of living.**

- **The HBV infection is a global problem, with 66 %of all the world's population living in areas where there are high levels of infection**

Based on HBsAg carrier rates, countries categorized into 3groups

Geographical Distribution

- Based on HBsAg carrier rates, countries categorized into 3groups

I. High Endemicity (>8 %),
II. Intermediate (2-8 %), and
III. Low Endemicity (< 2 %).

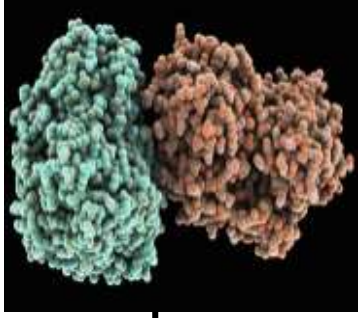
- Hepatitis B is endemic in China and other parts of Asia
- In these regions most people become infected in childhood
- and 8-10% of the adult population are chronically infected.

- In the Middle East an estimated 2-5% of the general population is chronically infected.
- In Western Europe and North America <1% population is infected

In Jordan The national prevalence of HBV is estimated to be around 2.4% (2017)and has declined from **9.9% (**1985) in the pre-vaccination era.

Epidemiological determinants

Agent factors



(a) Hepatitis B virus was discovered in 1963.

- **The virus is highly contagious**

❑ In highly endemic areas, hepatitis B is most commonly spread

❖ through vertical, from mother to child at birth (**perinatal transmission**) or

❖ through horizontal transmission (exposure to infected blood) especially from an infected child to an uninfected child during the first 5 years of life.

❖ The development of **chronic infection** is **common in infants** infected from their mothers or before the age of 5 years.

❖ **transmitted also through contact with the blood or other body fluids of an infected person**.

Agent factors

- **HBV has three distinct antigens (Ags)stimulating the production of three corresponding Abs**

1. **Surface Ag "Australia Ag"{HBsAg) surface Abs(anti-HBs**
2. **Core Ag {HBcAg), core Abs (anti-HBc)**and
3. **"e" Ag (HBeAg). "e" Abs (anti-HBe).**

These Abs and their Ags constitute very useful markers of HBV infection
Pts with HBV infection are expected to have one or more HBV markers

(b) Reservoir of Infection :

- **Man is the only reservoir of infection ;either carriers or cases.**
- continued infection is due to the **large number** of **the carriers**
- **The Persistent Carrier** state has been **defined** as the **presence**
- **of HBsAg (with or without concurrent HBeAg) for more than 6 months**
- **Cases may range from unapparent to symptomatic cases.**

(c) Infective Material:

- **Contaminated blood is the main source of infection,**
- the virus has been found in **body secretions** such as **saliva, vaginal secretions** and **semen of infected** persons.

d) Resistance :

- HBV is **quite stable** and
- **capable of surviving for at least 7 days on environmental' surfaces**. It is an **important occupational hazard for HCWs**
- **It can** be **readily destroyed by sodium hypochlorite,**
- by **heat sterilization** in an **autoclave for 30 -60 minutes**

(e) Period of Communicability :

- **HBV is present** in the **blood during the**
  - **incubation period (for a month before jaundice) and**
  - **acute phase of the disease.**
- **Period of communicability** is usually **several months**
  - {occasionally **years in chronic carriers**) **or**
  - **until disappearance** of **HBsAg** and **appearance of surface Abs**

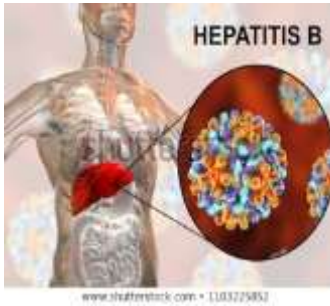
Host factors

(a)AGE :

- The outcomes of **HBV infection are age dependent**.

- **Acute HBV** occurs in approximately
  - **1 %of** perinatal,
  - **10 %of early childhood (1-5 years of age)** and
  - **30 %of late (> 5 years age)** HBV infections.
- **Mortality from fulminant HB is approximately 70 %**

- **The development of Chronic HBV infection is inversely related to age** and **occurs in approximately**
  - ✓ **95 % of persons infected perinatally**,
  - ✓ in **30 % infected in childhood (<6 years of age**)
  - ✓ in **5 % infected a≥ 6 years of age**



(b) High-risk Groups :

- Certain groups carry higher risks.
- Health care workers and Laboratory personnel

Annual incidence of HBV infection in surgeons is estimated to be 50 times greater than that in the general population, and more than twice that of other physicians.

- Recipients of blood transfusions,
- Homosexuals, Prostitutes, Percutaneous drug abusers,
- Infants of HBV carrier mothers,
- Recipients of solid organ transplants and
- Immunocompromised Patients

- Serological screening & vaccination of high-risk groups is highly recommended

(c) Hepatitis B and HIV Infection:

- **About 1% HBV pts (2.7 million) are also infected with HIV.**
- Conversely, WW the
- **Globally prevalence of HBV in HIV-infected persons** is **7.4%.**
- **Although HBV infection have a minimal effect on the progression of HIV,**
  - **HIV** markedly **increases the risk of developing HBV-associated liver cirrhosis &HCC**
  - **mortality rate increases among HIV-+ve due to HBV co infection**

Incubation Period

30 - 180 days.

Lower doses of the virus result often in longer IP.

average IP is about 75 days

DIAGNOSIS

It **is not possible, on clinical grounds, to differentiate HB from other viral hepatitis**

Laboratory BL **tests for confirmation** of the diagnosis **is essential**

- ***These Abs and their Ags constitute very useful markers of HBV infection.***
- ***Pts with HBV infection are expected to have one or more HBV markers.***

They can be **used to distinguish acute** and **chronic** infections.

- **Laboratory diagnosis of HBV infection focuses on the**
- **detection** of the **(HBs Ag)**.

❑ Acute HBV infection

is **characterized by the presence** of **HBsAg and IgM** antibody to the, **HBcAg**.

- **During the initial phase of infection**, patients are also **seropositive** for **HBeAg.**

- **HBeAg** is a **marker of high levels of replication** of the virus.
- The presence of **HBeAg indicates** that the **patient's blood**
- **and body fluids** are **HIGHLY INFECTIOUS**.

There are three distinct antigen antibody systems that relate to HBV infection and a variety of circulating makers that are useful in diagnosis. Interpretation of common serological patterns is as shown in Table below

Common serologic patterns in hepatitis B virus infection and their interpretation

HBsAg	Anti-HBs	Anti-HBc	HBeAg	Anti-HBe	Interpretation
+	-	IgM	+	-	Acute hepatitis B
+	-	IgG[1]	+	-	Chronic hepatitis B with active viral replication
+	-	IgG	-	+	Chronic hepatitis B with low viral replication
+	+	IgG	+ or -	+ or -	Chronic hepatitis B with heterotypic anti-HBs (about 10% of cases)
-	-	IgM	+ or -	-	Acute hepatitis B
-	+	IgG	-	+ or -	Recovery from hepatitis B (immunity)
-	+	-	-	-	Vaccination (immunity)
-	-	IgG	-	-	False-positive, less commonly, infection in remote past

Low levels of lgM anti-HBc may also be detected.

- **Chronic infection** is characterized by the
- persistence of **HBsAg for at least 6 months (with or without HBeAg).**
- **Persistence of HBs Ag** is the **principal marker of risk for**
- **Developing chronic liver** disease and **liver cancer (HCC) later in life.**

Modes Of Transmission

- HBV is spread by **percutaneous or mucosal Exposure to infected blood and various body fluids**, (*saliva, menstrual, vaginal, &* seminal fluids.

a. *Parenteral route*

- Hepatitis B is **a blood-borne infection**.
- **It is transmitted by infected Bl and Bl. Products, through**
- ***transfusions, dialysis, contaminated syringes and needles,***
- ***pricks of skin, handling of infected blood, accidental inoculation of minute quantities* of blood** such as may occur during **surgical** and **dental procedures**, **immunization**, **tattooing**, **ear piercing**, **nose piercing**, **circumcision**, **acupuncture,** etc .
- **also occur** through the **reuse of needles and syringes either:**
- in **health-care settings** or among **persons who inject drugs**
- **Accidental percutaneous inoculations** by **shared razors &tooth brushes**

b. *Perinatal transmission*

- Spread of infection from **HBV carrier mothers** **to their babies**

- **In highly endemic** areas,
- **HBV** is **most commonly** spread from **mother to child** at birth (**perinatal transmission**), **or**
- **through horizontal transmission** especially from an infected child to an uninfected **child during the first 5 years of life.**
- **The development** of **chronic infection** **is very common** in
- **infants infected** from their mothers **or** before the age **of 5 years** **appears to be an important factor for the high prevalence of HBV infection in some regions**, particularly China and Southeast Asia
- **Majority** of children **born to HBeAg+Ve mothers** become **chronically** infected.

The mechanism of perinatal infection is uncertain.

Although HBV can infect the foetus in utero, this rarely happens

- and **most infections appear** to **occur at birth,** as a result of a
  - **leak of maternal blood into the baby's circulation**, or
  - **ingestion** or **accidental inoculation of blood** .
- **Infection of the baby is usually anicteric and is recognized by**
  - **The appearance of surface antigen(HBsAg) between**
  - **60-120 days after birth**

c. Sexual transmission

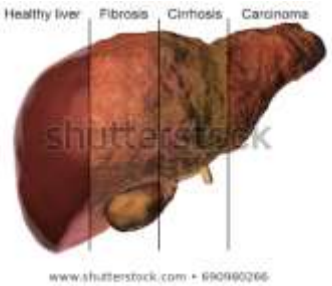
- There is **ample evidence** for the spread of infection by sexual route.
  - **The sexually promiscuous, particularly**
  - **male homosexuals, are at very high risk of infection with HBV.**
  - **Heterosexual** persons with **multiple sex partners** or
  - contact with **sex workers**

d. Other routes

- **horizontal transmission**: Transmission from **child-to-child, is responsible for a majority of HBV infections and carriers i**n parts of the world other than Asia.

The spread occurs through **physical contact** between children

- **In addition**, infection can occur during **medical, surgical and dental procedures**,
- through **tattooing,** or through the use of razors and similar objects that are contaminated with infected blood.



- **HB is an important occupational hazard for HCWs**
- In short, **transmission occurs in a wide variety of epidemiological settings**.
- **It can spread** either from **carriers or from people with no apparent infection,** or
- during **the incubation period**, **illness** or
- early **convalescence.**

Who is at risk for chronic disease?

- **The probability of HBV to becomes chronic depends upon the age at which a person becomes infected.**
  - **Children <6 years of age who become HBV infected are the most likely to develop chronic infections.**

In **infants and children:**

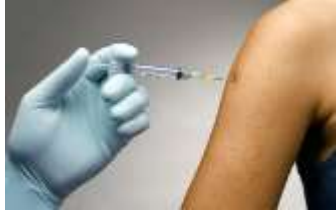
- **80–95%** of infants infected during **the first year of** life **develop chronic HBV**
- **30–50%** of children infected **before the age of 6 years develop chronic HBV**

In adults:

- **<5%** who are infected as **adults** will **develop chronic infection and**

- **20–30%** of **chronically infected adults will develop cirrhosis and/or liver cancer**

Prevention and Containment



- **SINCE THERE IS NO SPECIFIC TREATMENT,**
- **Prevention has been the major aim in managing HBV.**
- **HB is preventable with currently available safe&effective vaccines.**
- **WHO *strongly recommends that all regions and countries develop goals for HBV control appropriate to their epidemiological situation.***
- **The following measures are available : .**

a. Hepatitis B Vaccine

- ✓ **The recombinant hepatitis B vaccine was introduced in 1986.**
- ✓ **The active substance in hepatitis B vaccine is HBsAg**
- ✓ The vaccine is **95% effective** in **preventing** infection and
- ✓ **prevent** the development of **chronic disease** and **HCC** due to HBV.
- ❖ **Adults dose of 10-20 micrograms initially** and **again at 1 and 6 months**.(0 ,1, 6 month)
- ❖ **Children age <10 years half of the adult dose at the same time intervals. **Deltoid muscle** is preferred for injection

- ❖ **Deltoid muscle** is preferred for injection
  - ○ **For infants & children under 2 years, anterolateral aspect of thigh is used.**
- ❑ **Intradermal administration** is **NOT recommended** because the immune response is less reliable particularly in children
- ❑ HB vaccine **does not interfere** with immune response to any other vaccine & vice-versa.
- ❑ **The birth** dose of HB vaccine can be **given safely** together with BCG
  - ▪ However, the vaccines should be **given at different sites**

- ❑ **The vaccine should be stored at 2-8° C. Freezing must be avoided**
- ❑ **There are multiple options for incorporating (combine)the** HB vaccine into national immunization programmes.
- ❑ **The choice of schedule depends on the local epidemiological situation and programme considerations.**

- ❑ **The recommended schedule for vaccination categorized into those**

Hepatitis B Vaccine Cont.

The recommended schedule for vaccination categorized into those:

- **a birth-dose and**
- **those that do not.**

Schedules with a birth-dose

In countries with a **high perinatal HBV infection, specifically** where the prevalence of **chronic** HBV infection in the **general population is >8 %,**

- **First dose** of HB vaccine should be given **within 24 hrs after birth** to prevent perinatal
- **WHO** recommends that **all infants should** receive their **first dose** of vaccine as soon as **possible after birth,** preferably **within 24 hours**.
- **Birth (first) dose and** followed by
- **2nd , 3rd or 4th doses** to complete the primary series.
- **usually given with other routine infant vaccines**
- **minimum recommended interval between the doses is four weeks**
- **WHO does not recommend a booster dose of HB vaccine**

- **WHO does not recommend a booster dose of HB vaccine.**
- **Protection** lasts at **least 20 years**, and is possibly **life-long**
- The **low incidence** of chronic HBV infection in children under 5 years of age at present can be attributed to the widespread use
- of **HB** vaccine

low or intermediate endemicity. (*Immunization in adults*)

- **In those settings Routine pre-exposure vaccination should be**
- **considered for groups of adults high-risk groups They include:**
  - People who **frequently require blood or blood products, *dialysis patients, recipients of solid organ transplantations*;**
  - **People interned in prisons;**
  - **Persons who inject drugs;**
  - **household and sexual contacts of people with chronic HBV infection;**
  - **People with multiple sexual partners**
  - **Healthcare workers and others who may be exposed to blood and blood products through their work; and**

travellers who

- travellers who have not completed their HB vaccination series, before leaving for endemic areas
- Adults age ≥20 years should receive 1 ml of adult formulation.
- usual schedule for adults is two doses separated by no less than 4 weeks, and a third dose 4 to 6 months after the second dose
- All children and adolescents younger than 18 years-old and
- not previously vaccinated should receive the vaccine if they live in countries where there is low or intermediate endemicity

Hepatitis B immunoglobulin (HBIG)

- For immediate protection, HBIG is used for those acutely
- exposed to HBsAg-positive blood, for example

(a) surgeons, nurses or laboratory workers
(b) New born infants of carrier mothers
(c) sexual contacts of acute hepatitis B patients, and
(d) patients who need protection against HBV infection after liver transplantation.

The HBIG should be given

Cont. …Hepatitis B immunoglobulin (HBIG)

- The **HBIG should be given as soon as possible after an accidental inoculation (ideally within 6 hours and preferably not later than 48 hours)**.
- At the same time the victim's blood is drawn for **HBsAg testing**.
- If **the test is negative, vaccination should be started immediately**
- and a full course given.
- **If the test is positive for surface antibody, no further action is needed**
- **Recommended dose is 0.05 to 0.07 ml/kg of body weight.**
- **Two doses should be given 30 days apart .**
- **HBIG provides short-term passive protection approximately 3 months.**

Passive-active immunization .

- **The administration of HBIG and HB vaccine is more efficacious than HBIG alone.**
- **HBIG does not interfere with the antibody response to the HB vaccine.**
- **This combined procedure is ideal, both for**
- **prophylaxis of persons accidentally exposed to blood known to contain HBV , and**
- **prevention of the carrier state in the new-born babies of** carrier mothers.

HBIG (0.05-0.07 ml/kg)

Cont. … Passive-active immunization .

- **HBIG (0.05-0.07 ml/kg) should be given ASAP and within 24 hours, if possible.**
- **HB vaccine 1.0 ml (20 mcg/1.0 ml) should be given IM within 7 days of exposure, and**
- **2nd &3rd doses should be given one and six months, respectively, after the first dose.**

d. Other Measures

- implementation **of blood safety strategies,** including
- **screening of all donated blood and blood components** used for transfusion, can prevent transmission of HBV. Worldwide,
- **All blood donors should be screened for HBV infection,**
  - **and those positive for HBsAg should be rejected.**
- **Voluntary blood donation should be encouraged because purchased blood has shown a higher risk of post-transfusion hepatitis .**
- **Safe injection practices,**
- **Unsafe injections decreased** from **39% in 2000 to 5% in 2010**
  - . Furthermore, **safer sex practices, including minimizing the number of partners and using barrier protective measures**
- **Health personnel should be alerted to the importance of adequate sterilization of all instruments and to the practice of simple hygienic measures.**
- **HB Carriers should be told not to share razors or tooth brushes and use barrier methods of contraception; they should not donate blood**

Serological testing in vaccine recipients

Pre-vaccination serological testing:

❖ **It is recommended for**

✓ **ALL** persons born **in Africa, Asia**, the Pacific Islands, and other **regions with HBsAg prevalence of ≥2%**

✓ Household, sex and needle sharing contacts of **HBsAg-positive persons**

✓ **Homosexuals;**

✓ Injecting drug users;

✓ Certain persons receiving cytotoxic or immunosuppressive therapy.

❖ **is not indicated** before routine vaccination of **infants and children**

Post vaccination serological testing

❖ **It is recommended for**

- **chronic haemodialysis patients**
- **Immunocompromised**
- **persons with HIV**
- **sex partners of HBsAg+**
- **infants of HBsAg+ women certain HCWs**

❖ **Not routinely recommended following vaccination of infants, children, adolescents, or most adults.**

Thank You

Qs ???

QS ???

Hepatitis B In Jordan by Health District Year:2000-2014

ear	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Capital Directorate	2	15	4	3	5	2	3	3	2	0	0	0	1	0	0
Madaba Directorate	2	4	1	1	1	0	2	0	0	0	1	0	0	0	0
Balqa Directorate	0	3	1	3	1	2	4	0	2	2	0	1	0	0	1
Ramtha Directorate	0	0	0	0	1	4	1	3	0	0	0	0	0	0	0
Ma'an Directorate	0	0	2	1	1	0	1	0	0	0	0	0	0	0	0
Deir Alla Directorate	0	3	0	1	0	3	0	1	1	1	1	0	0	0	0
Agwar Shamaliyah Directorate	1	3	4	4	4	3	6	0	0	1	1	0	0	0	0
Tafeileh Directorate	3	4	2	6	3	0	1	0	1	0	0	0	0	0	0
Bani Kenaneh Directorate	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0
Badia Shamaliyah Directorate	0	1	0	0	2	0	0	0	0	0	0	0	0	0	0
Irbid Directorate	8	21	23	12	0	1	1	0	1	0	0	1	0	0	0
Ajloun Directorate	0	1	0	0	1	0	2	0	0	0	1	1	0	0	0
Mafraq Directorate	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0
Karak Directorate	2	3	0	0	0	0	0	0	0	0	0	0	0	0	0
East Amman Directorate	1	0	2	1	1	0	0	0	0	0	0	0	0	0	0
Shounah Janoobiyah Directorate	2	2	3	0	0	4	0	2	0	0	0	0	0	0	0
Koura Directorate	0	0	0	0	2	0	0	1	0	0	0	0	0	0	0
Zarqa Directorate	16	11	11	10	2	4	4	2	0	0	0	2	1	0	0
Aqaba Directorate	0	0	0	0	1	0	0	1	3	1	0	0	0	0	0
Jerash Directorate	2	0	1	3	2	9	0	2	2	0	0	0	0	0	0
Agwar Janoobiyah Directorate	-	-	-	-	-	-	0	0	0	0	0	0	0	0	0
Total	39	71	56	45	28	32	25	15	13	5	4	5	2	0	1