WHAT IS EB?

EPIDERMOLYSIS BULLOSA INFOGRAPHICS

debra International.

This is how life feels to people with EB.

LOWE GGK

CONTENTS

GENERAL INFORMATION

WHY ARE THE INFOGRAPHICS IMPORTANT?

The EB infographics contain information on different areas of EB clinical and social care. They are mainly picture rather than text based and target people affected by EB in low resource areas.

The idea to develop EB infographics came from the DEBRA International EB Without Borders team. The team's mission is to help people living with EB, their families, and doctors in countries where there is no DEBRA group to support them and little knowledge of EB clinical and social care.

WHO ARE THE EB INFOGRAPHICS FOR?

The EB infographics are for individuals living with or caring for someone with any type of EB. Although the EB infographics are targeted at people in low resource areas, the information is relevant to anyone living with or caring for someone with EB.

WHERE DOES THE INFORMATION IN THIS BOOKLET COME FROM?

The information in this booklet comes from the "Clinical Practice Guidelines for Epidermolysis Bullosa Laboratory Diagnosis" (Has et al. 2019), "Consensus reclassification of inherited epidermolysis bullosa and other disorders with skin fragility" (Has et al. 2020), and from expert opinion. The information and recommendations in the guidelines come from a variety of sources including clinical research and expert opinion.

HOW TO USE THIS INFORMATION ⚠

We strongly recommend that you consult with your doctor or EB healthcare professional before using the EB infographics so that they can discuss the information with you.

DISCLAIMER

The information contained in this EB infographics booklet does not indicate an exclusive course of action or serve as a standard of medical care. Variations, taking individual circumstances into account, may be appropriate. Users of this booklet are strongly recommended to confirm that the information contained within it is correct by way of independent sources. The development group of this EB infographics booklet has made considerable effort to ensure that the information provided is accurate and up to date. The development group and DEBRA International accept no responsibility for any inaccuracies; information perceived as misleading; or the success of any recommendations, advice, or suggestions detailed in this booklet.

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WHAT IS EB?

EB is not the name for a single skin disease, but a large group of clinically and genetically different diseases

There are more than 30 subtypes

Their common feature is the formation of blisters and extremely fragile skin

Blisters and wounds can occur from pressure, friction, or heat on the skin and/or mucous membranes

Symptoms can be seen immediately after birth/during first few days

Symptoms can range from mild to severe

Blisters can form anywhere on the skin and sometimes inside of mucous membranes

epidermolysis bullosa

- epiderm: Epidermis
- lysis: Breakdown
- bullosa: Blister

500,000 estimated people with EB in the world

Affects males and females equally

Can occur across all races and ethnicities

Not contagious

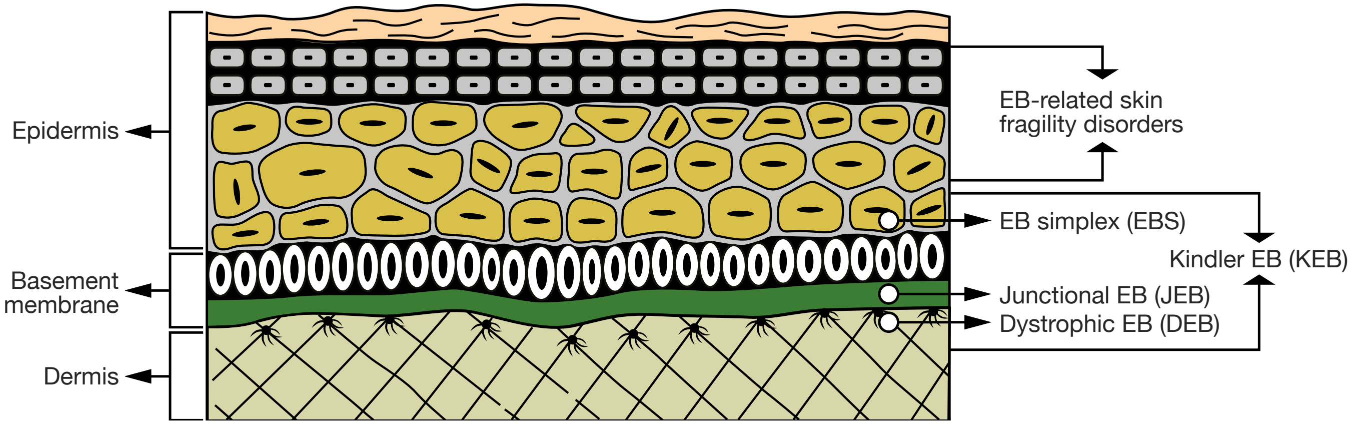
There is no cure yet

People living with EB are known as “butterflies” as their skin is as fragile as a butterfly’s wings

more info: www.debra-international.org **EB Without Borders:** ebwb@debra-international.org

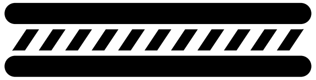
TYPES OF EB

CROSS-SECTION DIAGRAM OF THE SKIN



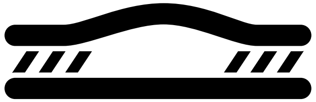
DEBRA International *- adapted from Debra of America, the US National Institute of Arthritis and Musculoskeletal and Skin Disease and Has et al. 2020*

NORMAL SKIN



Regular skin has proteins that are like glue holding the layers of skin together making it strong.

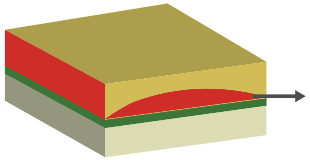
EB SKIN



In EB, these "glue" proteins do not work properly or are missing. This means the skin layers can separate forming blisters and tears. This can happen through injury, pressure, friction, heat, or even spontaneously.

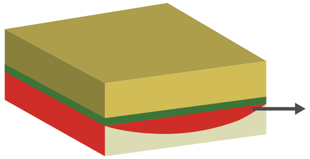
EB acquisita (EBA) - although the symptoms can be similar, EBA is not inherited. It is an autoimmune disease which doesn't usually appear until later in life and it is unknown exactly what causes it.

FREQUENCY AND CLASSIFICATION OF EB TYPES



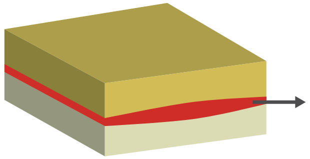
70%

Blisters (EBS)



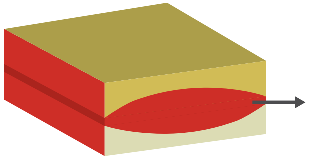
25%

Blisters (DEB)



5%

Blisters (JEB)

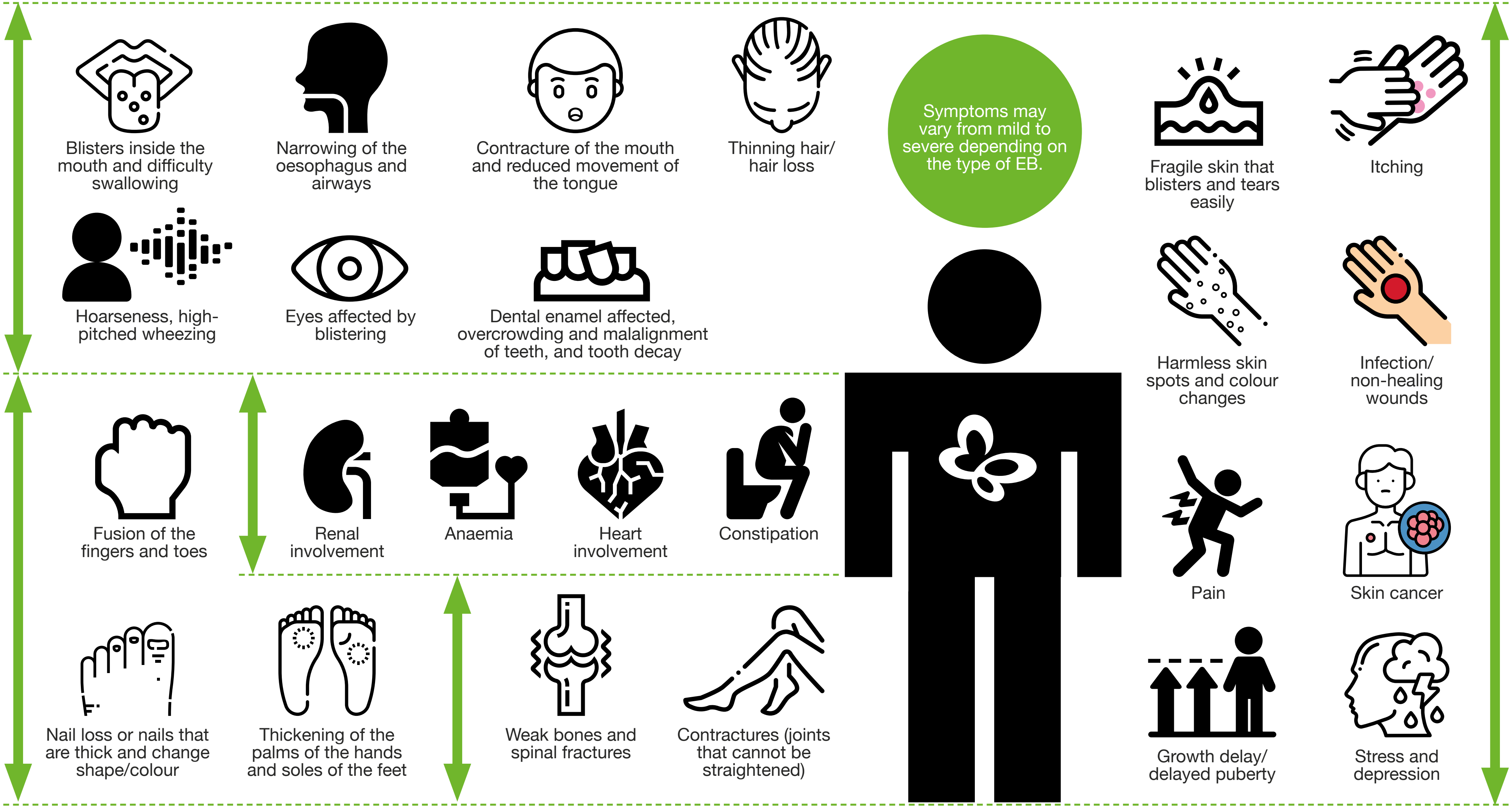


RARE

Blisters (KEB)

more info: www.debra-international.org **EB Without Borders:** ebwb@debra-international.org

SYMPTOMS AND COMPLICATIONS



Symptoms may vary from mild to severe depending on the type of EB.

- Blisters inside the mouth and difficulty swallowing
- Narrowing of the oesophagus and airways
- Contracture of the mouth and reduced movement of the tongue
- Thinning hair/ hair loss
- Hoarseness, high-pitched wheezing
- Eyes affected by blistering
- Dental enamel affected, overcrowding and malalignment of teeth, and tooth decay
- Fusion of the fingers and toes
- Renal involvement
- Anaemia
- Heart involvement
- Constipation
- Nail loss or nails that are thick and change shape/colour
- Thickening of the palms of the hands and soles of the feet
- Weak bones and spinal fractures
- Contractures (joints that cannot be straightened)
- Fragile skin that blisters and tears easily
- Itching
- Harmless skin spots and colour changes
- Infection/ non-healing wounds
- Pain
- Skin cancer
- Growth delay/ delayed puberty
- Stress and depression

more info: www.debra-international.org **EB Without Borders:** ebwb@debra-international.org

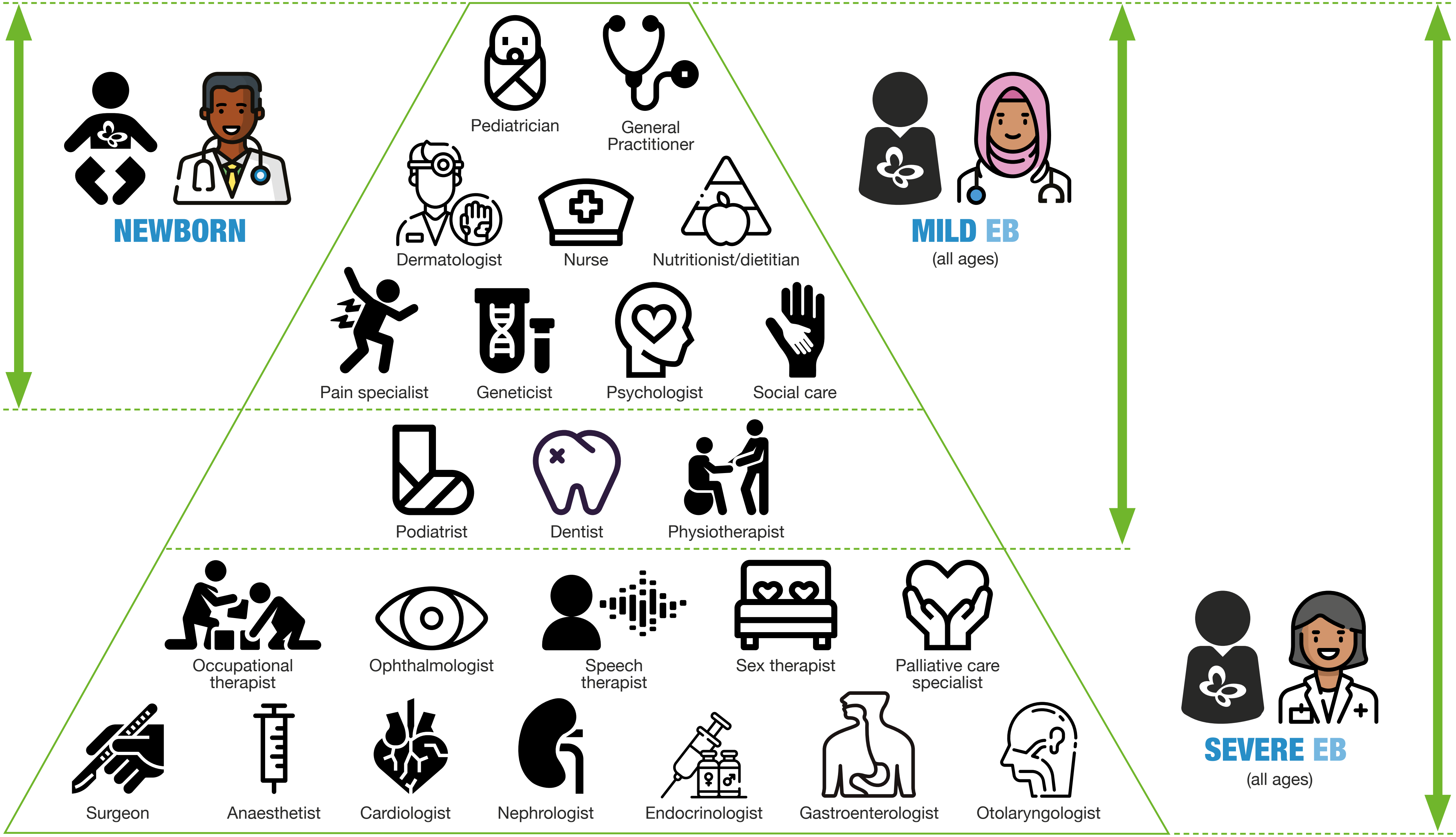
EB CARE PRACTICES

- Wound care and blister management
- Itch management
- Eye care
- Proper nutrition
- Occupational therapy
- Dental care
- Pain management
- Oesophagus dilatation
- Physiotherapy
- Podiatry care
- Psychosocial care
- Skin cancer management
- General health care
- Hand surgery and post-surgical rehabilitation
- Gastrostomy care
- Anaemia management
- Renal care
- Cardiac care
- Palliative care
- Prosthetics and orthotics
- Neonatal care

INTEGRATED CARE PLAN

EB has a range of symptoms and complications that require care from different medical specialists. Interdisclipinary care means a team of different specialists come together to coordinate a patient’s care plan as well as learn from each other’s specialties.

INTERDISCIPLINARY CARE



NEWBORN

Pediatrician

General Practitioner

Dermatologist

Nurse

Nutritionist/dietitian

Pain specialist

Geneticist

Psychologist

Social care

Podiatrist

Dentist

Physiotherapist

Occupational therapist

Ophthalmologist

Speech therapist

Sex therapist

Palliative care specialist

Surgeon

Anaesthetist

Cardiologist

Nephrologist

Endocrinologist

Gastroenterologist

Otolaryngologist

MILD EB
(all ages)

SEVERE EB
(all ages)

NEWBORN WITH EB

SYMPTOMS

Skin may be absent entirely, particularly on the feet, ankles, and lower legs

Skin may blister immediately after birth/during first few days

WHAT HAPPENS WHEN EB IS SUSPECTED?

A dermatologist should rule out other skin disorders

Laboratory diagnosis should be done. See page 13

An integrated care plan should be coordinated by an interdisciplinary team

NEWBORN CARE

See Healthy Body and Skin infographics for information on wound care

Nappies should have a good fit to reduce friction. Add a soft cloth liner on the edges if necessary

Wear front-fastening baby grows. Naked babies can damage themselves by rubbing their arms and legs

Wear clothes inside out to avoid the rough seams causing skin problems with rubbing and pressure

Mittens and short nails help to prevent damage caused by scratching

Place your baby on soft padding (pillow, sheepskin, soft blanket)

Your baby may and should be touched one way or another to help with bonding

Breastfeeding is possible with a baby with EB and should be tried

Training parents on wound care/bathing/general care of a baby with EB is necessary

A social worker can guide parents about their rights, as wound care products can be expensive

IMPORTANT!

Avoid using an incubator (unless absolutely necessary)

Do not use tape or plasters/bandaids

Not lifting from under the arms

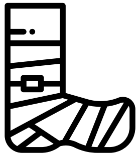
Do not put name tags on wrists or ankles. Attach to bed/clothes instead

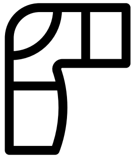
Do not use umbilical clamps

Follow normal childhood vaccine schedule

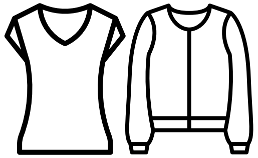
more info: www.debra-international.org **EB Without Borders:** ebwb@debra-international.org

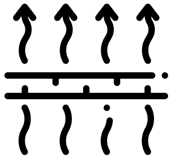
LIVING WITH EB

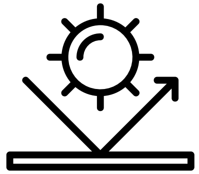

See Healthy Body and Skin infographics for information on wound care

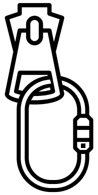

Protect vulnerable skin sites by wearing gloves and padding

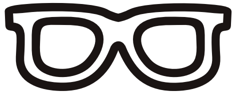

Keep skin moisturised to minimise itching, reduce friction, and prevent skin from cracking

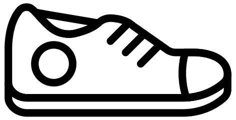

Dress in layers that you can put on and take off easily when needed

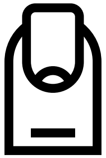

Soft and breathable materials are more suitable


Use UV-protective clothing in summer


Use small aids to help independence in everyday activities


Pad eyeglasses to protect the nose and ears

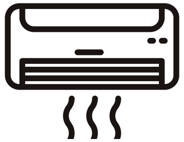

Ensure footwear is soft and breathable. See Healthy Body and Skin infographics

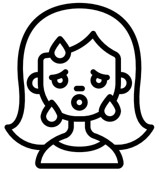

Keep your finger and toe nails short and smooth. See Healthy Body and Skin infographics


Use padding on car seats and other hard surfaces

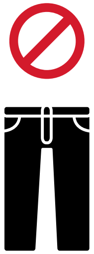

Physical exercise is good for mobility and bone health

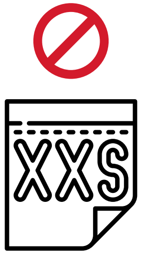
IMPORTANT!


A fan or air conditioner may help to keep the skin cool


Heat, sweat, and humidity increase blisters


Avoid hot baths


Avoid tight clothes

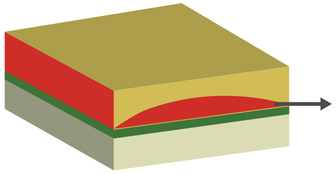


Avoid clothes with rough labels, tight elastic, or seams. Turn clothes inside out to avoid seams.


Do not use tape or plasters/bandaids

more info: www.debra-international.org **EB Without Borders:** ebwb@debra-international.org

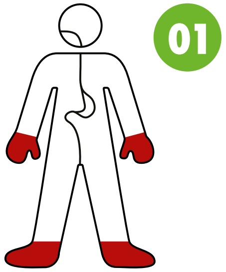
EB SIMPLEX (EBS)



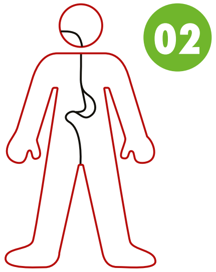
70%

Blisters in the epidermis

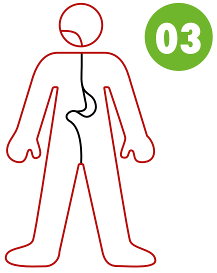
Most common EB type



LOCALIZED EBS
previous names: Weber-Cockayne
affected genes: KRT5, KRT14
inheritance patterns: dominant, de novo, recessive (rare)



INTERMEDIATE EBS
previous names: EBS generalized intermediate, EBS Köbner
affected genes: KRT5, KRT14
inheritance patterns: dominant, de novo, recessive (rare)



SEVERE EBS
previous names: EBS generalized severe, EBS Dowling-Meara
affected genes: KRT5, KRT14
inheritance patterns: dominant, de novo, recessive (rare)

COMMON SYMPTOMS AND COMPLICATIONS

For full details, visit: www.debra-international.org/eb-simplex

01 02 03

- Blisters mainly on hands and feet
- Harmless skin spots and colour changes can occur
- Itching
- Risk of being overweight/obese
- Skin thickens on the soles of the feet
- Nails may be thick and change shape/colour
- Blistering can improve during puberty

02

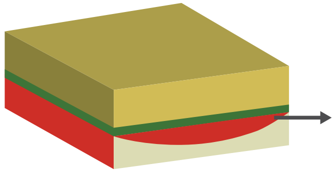
- Blistering is widespread but less severe

03

- Inside of the mouth is usually affected (infancy)
- Constipation
- Can be life threatening during first year of life

more info: www.debra-international.org **EB Without Borders:** ebwb@debra-international.org

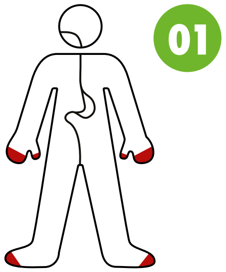
DYSTROPHIC EB (DEB)



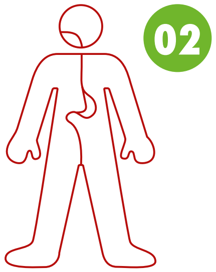
25%

Blisters in the dermis

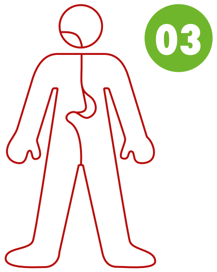
Less common than EBS



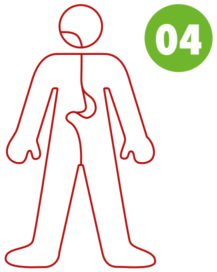
LOCALIZED DDEB
previous names: nails only, pretibial and acral DDEB
affected genes: COL7A1
inheritance patterns: dominant



INTERMEDIATE DDEB
previous names: generalized DDEB
affected genes: COL7A1
inheritance patterns: dominant



INTERMEDIATE RDEB
previous names: RDEB generalized intermediate, non-Hallopeau–Siemens RDEB
affected genes: COL7A1
inheritance patterns: recessive



SEVERE RDEB
previous names: RDEB generalized severe, Hallopeau–Siemens RDEB
affected genes: COL7A1
inheritance patterns: recessive

COMMON SYMPTOMS AND COMPLICATIONS

For full details, visit: www.debra-international.org/dystrophic-eb

01

- Fragile skin mainly affects fingers, toes, and nails
- Sometimes only nails are affected (thick and shape/ colour change)

01 02 03 04

- Skin cancer (teen years - most common in severe RDEB)
- Constipation (particularly in severer DEB)
- Inside of the mouth may be affected (most common in severe RDEB)

02 03

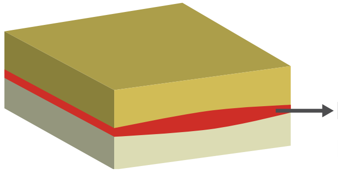
- Harmless skin spots occur
- Non-healing wounds
- Some fusion of the fingers and toes (mainly intermediate RDEB)
- Joints cannot straighten easily
- Oesophageal blistering common
- Eyes are usually affected

04

- Blistering is widespread
- "Mitten" hands
- Nails lost (first years of life)
- Large joints cannot straighten
- Hair loss
- Anaemia
- Weak bones/ spinal fractures
- Growth delay/ delayed puberty
- Mouth contracture/ reduced tongue movement
- Overcrowding/ malalignment of teeth/tooth decay
- Skin cancer is a frequent cause of death

more info: www.debra-international.org **EB Without Borders:** ebwb@debra-international.org

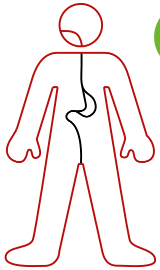
JUNCTIONAL EB (JEB)



5%

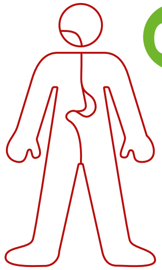
Blisters in the basement membrane

Less common that EBS or DEB



01

INTERMEDIATE JEB
previous names: JEB generalized intermediate, non-Herlitz JEB
affected genes: LAMA3, LAMB3, LAMC2, COL17A1
inheritance patterns: recessive



02

SEVERE JEB
previous names: JEB generalized severe, Herlitz JEB
affected genes: LAMA3, LAMB3, LAMC2
inheritance patterns: recessive

COMMON SYMPTOMS AND COMPLICATIONS

For full details, visit: www.debra-international.org/junctional-eb

01 02

- Harmless skin spots and colour changes can occur
- Itching
- Inside of the mouth is usually affected
- Tooth enamel affected
- Eyes are usually affected by blistering
- Thinning hair and hair loss
- Anaemia (more common in severe JEB)

01

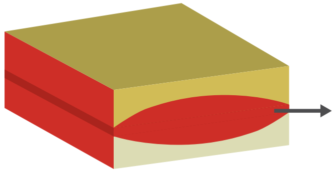
- Blistering is widespread but less severe
- Nails are usually lost or thick and change shape/ colour
- Skin cancer (adulthood)

02

- Few blisters (first couple of weeks of life)
- Non-healing wounds on buttocks, face, ears, and tips of the fingers and toes.
- Inside of the mouth, nose, oesphagus, and windpipe affected. Airway obstruction can be life threatening.
- Nails lost (first few months of life)
- Hoarseness and high-pitched wheezing
- Life expectancy is unfortunately very limited (few weeks to a couple of years)

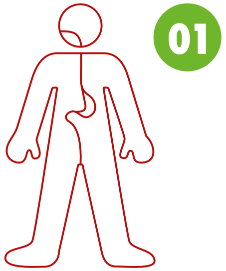
more info: www.debra-international.org **EB Without Borders:** ebwb@debra-international.org

KINDLER EB (KEB)



RARE

Blisters occur at multiple and different levels



KINDLER EB
previous names: Kindler syndrome
affected genes: FERMT1
inheritance patterns: recessive

COMMON SYMPTOMS AND COMPLICATIONS

For full details, visit: www.debra-international.org/kindler-eb

01

- Blistering is widespread and tends to affect the extremities. Blistering tends to decrease with age
- Loss of ridges and lines of the skin on the hands, such as fingerprints
- Fusion of the fingers and toes leading to “mitten” hands
- Nails may be thick and change shape/ colour
- Skin thickens on the palms of the hands and soles of the feet
- Eyes are usually affected by blistering
- Narrowing of the urinary and genital organs can occur
- Gingivitis, tooth loss, and overgrowth of gum tissue around the teeth
- Skin cancer on extremities, lips, or oral cavity (young adulthood)
- Skin cancer in Kindler EB is aggressive and can cause premature death. Regular check-ups for skin cancer monitoring is required

more info: www.debra-international.org **EB Without Borders:** ebwb@debra-international.org

LABORATORY DIAGNOSIS

Skin sample
First diagnostic step in newborns.
Delivers fast results

Immunofluorescence Mapping (IFM)
Shows if an EB-associated protein is absent or reduced. Delivers results in a few hours

Transmission Electron Microscopy (TEM)
Direct examination of the skin under a microscope. Rarely used in EB diagnosis but can be useful to solve difficult cases

Blood sample
Identifies the specific variant causing EB in a person’s DNA

Sanger sequencing (SS)
Identifies the variant causing EB by analysing a specific EB gene

Next generation sequencing (NGS)
Identifies the variant causing EB by analysing ALL EB genes at once

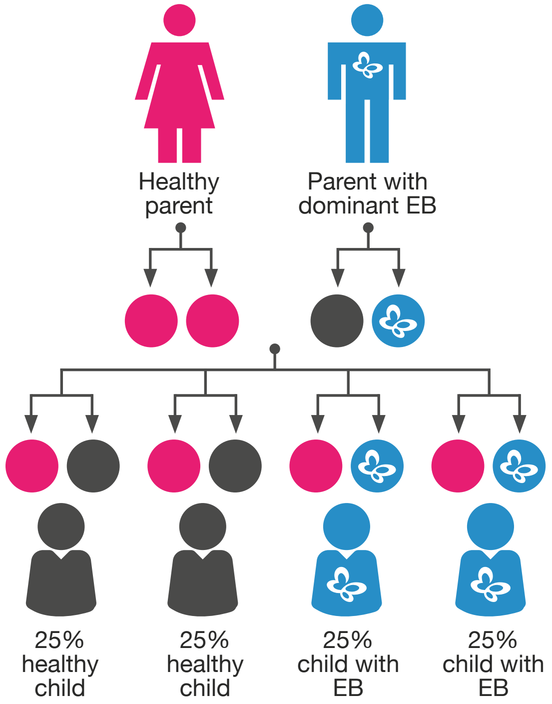
IMPORTANT!

- A dermatologist should rule out other skin disorders
- Ideally, both genetic testing on a blood sample and analysis of a skin sample should be performed
- EB subtypes will predict the disease severity allowing personalised treatment and care
- It is important to determine the (sub)type of EB in order to participate in clinical trials
- Receive genetic councelling

INHERITANCE PATTERNS IN EB

AUTOSOMAL DOMINANT INHERITANCE

One parent is affected and passes the altered gene on to their child. There is a 50% chance that any child of theirs would be born with EB.



Healthy parent

Parent with dominant EB

25% healthy child

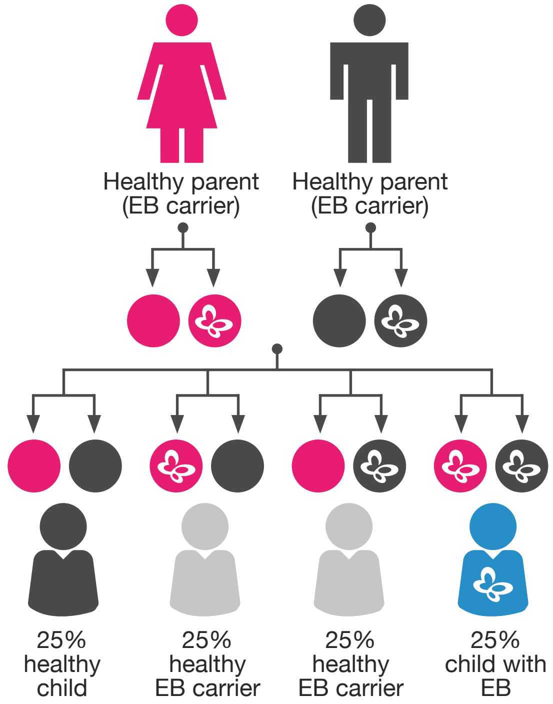
25% healthy child

25% child with EB

25% child with EB

AUTOSOMAL RECESSIVE INHERITANCE

Both parents are unaffected but are carriers of the disease. For any child of theirs to be born with EB, the child would have to inherit the disease-causing variant from both parents. There is a 25% chance of this occurring.



Healthy parent (EB carrier)

Healthy parent (EB carrier)

25% healthy child

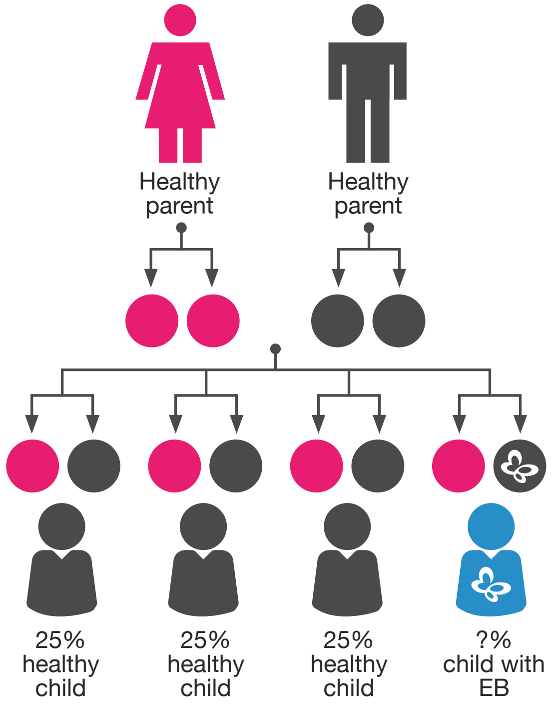
25% healthy EB carrier

25% healthy EB carrier

25% child with EB

“DE NOVO” INHERITANCE (DOMINANT ONLY!)

In this situation, EB happens spontaneously for the first time in a person. For the parents, having a second child or more with EB is very rare. The person carrying a de novo variant has a 50% chance of passing it (and EB) on to their children.



Healthy parent

Healthy parent

25% healthy child

25% healthy child

25% healthy child

?% child with EB

GENETIC COUNSELLING

Once EB is diagnosed, a person with EB and their family should seek counselling with a genetic counsellor or another specialist. The genetic counsellor should explain to the family:

- what EB is
- the inheritance pattern
- the specific results of laboratory tests
- the prediction of disease severity
- the options for family planning
- prenatal testing

more info: www.debra-international.org **EB Without Borders:** ebwb@debra-international.org

RESEARCH

Research looks at studies in a condition to help understand the disease and how we may treat it. It also helps answer areas of knowledge we lack.

WHY IS RESEARCH IMPORTANT?

Understanding the biology and genetics of all forms of EB can lead to new approaches to diagnose and treat EB

Develop therapies (including possible gene, cell, drug, or protein therapies) for possible treatment(s) of EB

Understand the nature of skin cancer in EB, to develop prevention strategies of these symptoms

Improve the management of EB through symptom relief

DEBRA INVOLVEMENT IN RESEARCH

Almost 40 years investing in research

€54+ million invested

220+ research projects funded

76 DEBRA-funded institutions

130+ DEBRA-funded researchers

Many academic funded projects are now receiving biopharma support

POTENTIAL TREATMENTS

Wound care advancements

Protein replacement

Stem cell transplant

Gene therapy

more info: www.debra-international.org **EB Without Borders:** ebwb@debra-international.org

CLINICAL TRIALS

Clinical trials are a type of research that studies new tests and treatments and evaluates their effects on human health outcomes. (WHO definition)

The aim of a clinical trial is to obtain authorisation to make effective therapies available to patients

The number of people with EB participating in clinical trials is small; because of this, the need for international trials is high

DEBRA has pledged more than €140,000 to develop and maintain a Global EB Patient Registry

The Global EB Patient Registry will identify patients for clinical trials

The Global EB Patient Registry will help to monitor drug safety

STANDARD CLINICAL TRIAL PHASES

PHASE 0

- Laboratory research
- Not tested in humans

PHASE I

- First application in humans
- Safety and tolerability testing with low doses of the drug
- Analysis of the effectiveness and behaviour of the drug in the human body
- 20 to 100 healthy volunteers

PHASE II

- Therapeutic trial phase
- Ascertaining the optimal dose and safety (toxicity) testing
- Checking the feasibility of the application
- 100 - 500 patients with the disease

PHASE III

- Confirmation of its effectiveness and safety
- Review of effectiveness compared to known drugs
- 1000 - 5000 patients with the disease

PHASE IV

- Data “from real life”
- Safety monitoring (does the product interact with other drugs?)
- Therapy optimisation of approved drugs

CLINICAL TRIAL TERMS

Open-label

Open-label trials can be used to compare two very similar treatments to see which is most effective. Both researchers and participants know if they are getting the treatment or the placebo

Comparative

When the investigative drug is compared against a placebo or another active drug

Blinded

When information is withheld from one or all those conducting or participating in the trial to reduce bias

Randomised

Participants are randomly allocated to receive the treatment or placebo

more info: www.debra-international.org **EB Without Borders:** ebwb@debra-international.org

EB AWARENESS

WHO?

- Neighbours and local community
- Extended family and friends
- Local and national governments
- Employers and colleagues
- Radio, newspaper, TV, and magazine companies
- Health and social care professionals
- Public safety officials
- Hospitals
- School staff and classmates
- Extra curricular activity teachers and classmates
- Social club friends
- Sports teammates

HOW?

- Share DEBRA CPG-PV and infographics
- Share this “What is EB?” infographic
- Join activities during EB Awareness Week (25~31 October)
- Give seminars to share your knowledge/story
- Media
- Make a presentation to talk about EB before starting at a new school/job
- Connect to your local DEBRA for campaign and fundraising ideas, flyers, or create your own
- Use social media, YouTube, and blogs as a tool for EB awareness
- Connect with other people living with EB/ rare diseases
- Vote and petition

WHY?

Working together makes us stronger.

- To educate those around you about EB and how can they help you/your child
- To increase awareness and knowledge about the condition
- To advocate for your rights
- To teach that it is a genetic disease and people will not “catch” EB
- To stop bullying/ discrimination
- To fight for inclusion, not segregation

more info: www.debra-international.org **EB Without Borders:** ebwb@debra-international.org

ICON KEY

EB symptoms can vary from mild to severe, even within the same subtype

Treatment should be tailored to each person

An integrated care plan should be coordinated by an interdisciplinary team

Even in cases where the life expectancy is poor, each individual condition cannot be predicted

The inclusion of a palliative care team may be recommended in severe cases

Read the Clinical Practice Guidelines (CPGs)/Patient Versions for more information

This icon has important information on what you should avoid

Consult with your doctor or EB healthcare professional before using the EB infographics

Your baby may and should be touched one way or another to help with bonding

A child with EB will bring much love, laughs, and beautiful experiences

OTHER EB INFOGRAPHIC BOOKLETS

EB requires a interdisciplinary team for the care of EB. Wound treatment alone is not effective as we also need to learn about a healthy diet and other topics. Check the other infographics that we have created to help you manage life with EB.

Balanced life and social life

Care of a newborn

Heathy body and skin

Healthy eating and nutrition

Healthy mind and control

Pregnancy and birth

Stay active and mobile

What is EB?

more info: www.debra-international.org **EB Without Borders:** ebwb@debra-international.org

CONTACT INFORMATION

DEBRA INTERNATIONAL

DEBRA International is the umbrella organisation for a worldwide network of national groups that work on behalf of those affected by the rare genetic skin blistering condition, epidermolysis bullosa (EB). The first DEBRA group was created over 40 years ago; there are now groups present in over 50 countries around the world.

www.debra-international.org
office@debra-international.org

DEBRA International Congress in New Zealand (2017) Photo credits: ©Silver Duck

EB WITHOUT BORDERS

EB Without Borders is a key initiative of DEBRA International. Its mission is to help patients, families, and doctors in countries where there is no DEBRA structure to support them, and to assist new groups to form and develop.

ebwb@debra-international.org

EB INFOGRAPHICS SURVEY

Help DEBRA International evaluate how the EB infographics are helping you. Complete the survey to give your opinions and suggestions.

https://surveyhero.com/c/EBinfographics

EB CARD

Our EB card has been designed to help you easily explain to anyone in your community what EB is and how it affects you/your child. It also provides key medical care information for health professionals looking after you who may not have treated someone with EB before. You can download and print as many EB cards as you like from our website.

We advise checking with your local DEBRA group to see whether they have already designed their own card for you to use.

www.debra-international.org/eb-card

NOTES

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Get involved with DEBRA International

THE WORLD'S LEADING EB PATIENT ADVOCACY AND SUPPORT NETWORK

DEBRA INTERNATIONAL IS REGISTERED AS A CHARITY IN AUSTRIA (ZVR 932762489)

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debra
International.