**Paediatr Croat.** 2016;60:21-6
PREGLED / *REVIEW*
www.paedcro.com
http://dx.doi.org/10.13112/PC.2016.4

# Skin of the very premature newborn – physiology and care

Sonja Anić Jurica[1], Ana Čolić[1], Snježana Gverić-Ahmetašević[1], Damir Lončarević[1], Boris Filipović-Grčić[2], Jasminka Stipanović-Kastelić[2], Arnes Rešić[3]

*Skin is a multifunctional human organ. It has a protective, regulatory and sensory function. Skin of the very premature newborn is underdeveloped with deficient functionality and has to be observed and treated as an immature organ in need of special care and interventions. Appropriate prevention and compensation of water and heat losses is obligatory as preserving the integrity of the skin and therefore of the entire body.*

**Keywords:** neonatal intensive care unit; neonatal prematurity; skin physiology

## INTRODUCTION

Skin is the largest human organ. It is multifunctional with protective, regulatory and sensory role. Skin is a barrier and connection between the body and the environment. It protects the body from injuries, mechanical, chemical and biological stimuli, microbes, plays an important role in the regulation of fluids and temperature, and mediates senses of heat, cold, touch, pain and comfort.

Skin of the very premature newborn <32 weeks of gestational age has immature structure and insufficient function.

We will briefly address some features of the very premature skin that affect the function characteristics of medical concern.

## DEVELOPMENTAL AND FUNCTIONAL FEATURES OF VERY PREMATURE SKIN

Skin consists of two layers, epidermis and dermis. Epidermis is the superficial layer. Dermis is a deeper layer composed of connective tissue. The outer layer of the skin begins as a single layer and as development progresses it becomes multilayered. After sixth months of pregnancy, epidermis becomes a barrier between the fetus and external environment instead of participant in exchanges between the two (1-3). At 21 weeks of gestation, the stratum corneum is formed. As keratinocytes move from deeper layers to the outer layer of stratum corneum, they lose their nuclei. At 28 weeks, the stratum corneum consists of two or three cell layers. By 32 weeks, there are more than 15 layers that are equivalent to adult skin. In premature newborns of <32 weeks of gestational age, stratum corneum is very thin. Such immature stratum corneum does not sufficiently prevent transepidermal water loss, absorption of external agents and invasion of microbes (1-9). Birth with exposure to external environment stimulates and accelerates maturation of epidermal barrier in prematures. Stratum corneum matures rapidly till the end of the first week of life but achieving full maturation may take more than four weeks. The process of maturation differs with gestational age; with less than 25 weeks of gestational age, it takes eight to ten weeks for stratum corneum to mature, while in those of more than 27-28 weeks of gestational age it reaches full maturity in about ten days. Birth triggers cornification of keratinocytes in the epidermis. Accelerated formation of stratum corneum is responsible for increased desquamation and flakiness. Dry flaky skin is a weak barrier. During development, visible changes of the skin occur. Immature skin is

[1] Division of Neonatology, University Department of Obstetrics and Gynecology, Zagreb University Hospital Center
[2] Division of Intensive Care and Neonatology, University Department of Pediatrics, Zagreb University Hospital Center
[3] Department of Clinical Toxicology and Pharmacology, Zagreb Children's Hospital, Zagreb, Croatia

**Correspondence to:**
Sonja Anić Jurica, MD; Division of Neonatology; University Department of Obstetrics and Gynecology; Zagreb University Hospital Center; Petrova 13; 10000 Zagreb

*Primljeno/Received: 22. 2. 2016., Prihvaćeno/Accepted: 17. 3. 2016.*

gelatinous, almost transparent and loses transparency as it matures, i.e. thickens and gets keratinized (1-9).

Palmoplantar eccrine sweat ducts are first to develop of the secretion apparatus; by 22 weeks, they open to the skin surface and join the secretory cells of the eccrine sweat glands. Maturation of the eccrine apparatus elsewhere on the body follows at 24-26 weeks. Depending on the site, eccrine glands produce sweat in response to an increase in temperature (thermal sweating) or to pain or emotional stress (emotional sweating). Prematures do not show thermal sweating immediately after birth but maturation is accelerated after birth, so some degree of thermal sweating exists at the age of 2 weeks. Emotional sweating is confined to palms and soles. Preterm infant at 27 weeks shows evidence of mild palmar sweating but there is no accelerated postnatal maturation (4).

Formation of sebum glands starts at 16-18 weeks but peaks in third trimester. Vernix is a natural white cream wraper made of sebum and shed cells in the last trimester of pregnancy. It protects the skin from constant exposure to amniotic fluid. Vernix makes the fetus waterproof during the time of epidermal barrier development. It also preserves water. In very premature newborn, there is no or little vernix (1-3, 5-11).

By the fifth month, differentiation of arterioles, venules and capillaries can be recognized but considerable maturation of dermal blood supply occurs after birth (2, 4).

Sensory nerve endings are visible at fourth month and the fetus can respond behaviorally, physiologically and hormonally to touch and pain by 20 weeks. The sensory nerve endings are well developed in the newborn regardless of maturity. More mature infants show habituation to repeated stimulation but the most immature infants show sensitization (1-4).

At about 26 weeks of gestational age, deposition of subcutaneous fat begins. The amount of subcutaneous white fat increases with advancing pregnancy. Brown fat is a deeper structure, located mostly at the root of the neck, behind the sternum and in perirenal area. It starts to form around 17-20 weeks of gestation. It is specialized adipose tissue that produces heat by oxidizing fatty acids. In premature newborns, it is incompletely developed (1-3).

## LOSSES OF WATER AND HEAT

Newborns dissipate heat by four mechanisms: evaporation, conduction, convection and radiation. In thermoneutral environment, regulatory changes of heat production or evaporative losses are not initiated. Such environment is important for the newborn not just for survival and growth but for stability of many physiological functions as well (12, 13).

At birth, premature newborn exits a warm and moist environment into cold and dry one and loses water and heat due to evaporation. The amount of transepidermal losses depends on the body surface, so in prematures the increased ratio of body surface and body mass is an additional factor for increased transepidermal losses in immature skin. During the first four weeks of life, transepidermal loss of water and gestational age and body mass are transportional. Small prematures have higher blood flow through the skin and more water *per* kilogram body mass, which also increases the losses. Transepidermal losses and therefore demands decrease towards the end of the first week of life as stratum corneum matures and becomes less permeable for water but at four weeks of age it may still be double than the loss of the term newborn. High losses may result in hypernatremia dehydration, but losses of sodium, potassium and chlorine are possible as well. Skin damage increases the losses. Damage may occur due to thermal, chemical and mechanical injuries that are common in prematures. It may be caused by blood sampling and positioning of intravenous routes, removal of adhesive tapes and leads, or prolonged exposure to antimicrobial substances. Losses are also increased by skin manifestations or function impairment due to nutrient deficiency requiring high daily inputs in prematures such as proteins, essential fatty acids, vitamins A, D, C and B. Increased motor activity and crying increase the losses by up to 7% (3, 6, 14).

Amniotic fluid that covers the baby after birth also wastes heat by evaporation from the body. Without intervention, body temperature would fall 0.2 °C to 1 °C *per* minute due to quick cooling by convection from newborn skin to delivery room air and by fast evaporation. Conduction after birth has small impact because newborn is in contact with wraps of low conductivity. Losses by radiation on cold surrounding objects such as incubator walls are also possible. Increased activity such as crying and agitated motions due to exposure to coldness, vasoconstiction, thermogenesiss without shivering appear immediately after exposure to cold air. Sense to coldness increases metabolism up to 2-3 times to preserve temperature for few hours in term newborn until reserves of glycogen and brown fat are exhausted. Prematures with immature thermogenic response and without metabolic substrate reserves that are stored in the last trimester of pregnancy cannot adequately react. Due to systemic and pulmonary vasoconstriction relative hypoxia may occur. In the presence of dermal vasonstriction, skin temperature falls relative to deep body temperature, thus increasing the core-skin temperature gap. Greater gap can reflect wellbeing of the newborn (13).

Temperature of the environment beyond neutral zone enhances heat and water losses without increasing body tem-

perature. Increased body temperature either caused by fever or external source increases the losses. Newborn has limited possibility to sweat and prematures do not react with sweating to increased temperature in early postnatal period. Non ionizing radiation energy in the form of open heaters and phototherapy increases losses by up to 50% (4, 6, 7, 13).

## PREVENTION AND COMPENSATION OF WATER AND HEAT LOSSES

Recognizing the mechanisms of water and heat losses enables us to prevent or at least reduce them and compensate for them. Premature newborns cannot survive outside the uterus without interventions due to high losses of heat and water.

After birth, prematures are wrapped in plastic/polyethylene wraps, bags or foil without drying and placed in the incubator to prevent exposure to coldness. Increase of humidity in the incubator significantly decreases water losses and consequently additional losses of heat by evaporation. There are no uniformed protocols for humidity in the incubators for very premature newborns in neonatal intensive care units. Protocols differ in duration, weaning and gestational age at which certain patterns are applied. Most units start humidity at >80% for babies ≤28 weeks of gestational age, keeping it that way for the first week and then start weaning by 0.5%-10% *per* day until 40% is reached. In some units, gestational age for this pattern is lower and in others higher. Some keep humidity at 70%-80% for those at 28-30 weeks, some for those up to 32 weeks, for a day or three days and then start weaning with completion within a week. Some keep the humidity until 32 weeks corrected for age is reached. Some keep it at 40%-50% for a month. In prematures of <26 weeks of gestational age, high humidity may be required for up to 4 weeks to cope with high sodium level. Prolonged humidity delays maturation of the skin. Humidification is obligatory for the first week in prematures of less than 30 weeks of gestational age (3, 13-21).

Thermoregulation of the child in the incubator is regulated by settings of the incubator. Servo control is preferred for very premature babies keeping the auxiliary temperature between 36.5 °C and 37 °C. It is necessary to check the core temperature due to the possible differences between peripheral and core temperature in such prematures, which may reflect some adverse conditions. In more stable babies, servo control may not be obligatory (13).

Plexiglas shields that protect from temperature increment are effective in prematures in incubators, especially those treated with phototherapy (13-17).

Open heaters with non ionizing radiation and heated mattresses are also used in prematures of higher gestational age and more postnatal days. Capacity of the baby for sufficient thermoregulation to be taken out of the incubator is primarily defined by the overall state of the child. Some units test the capability of the child to preserve adequate temperature. Most units base the decision on the body mass reached. Previously recommended weight when babies were dressed in clothes and kept in cribs was 1800 grams. However, researches have shown that it prolongs their hospital stay. Newly recommended weight for taking babies out of the incubator is 1600 grams, of course, if the baby is stable enough (13-18).

The skin to skin method is adopted in neonatal units and if processed appropriately, by covering adequately parts of the baby that are not in skin to skin contact, in warm room, the method shows no drops in temperature of the child while carrying other benefits that will be addressed later (22).

Appropriate hydration of keratinocytes is essential for normal skin maturation, optimal barrier against external influences, and maintaining the balance of temperature, water and electrolytes. Adequate recoupment is crucial for the functioning of the body. Precise balance of water and electrolytes is most important, especially in prematures. Losses of fluids are supplemented intravenously. Supplementation is traditionally defined by standardized compensation criteria measuring losses according to body mass, urine and stool losses and results of extracellular electrolytes, all indicators with time lag. It is necessary to secure adequate input of proteins, essential fatty acids, zinc, biotin and vitamins (3, 14).

## PRESERVATION AND CARE OF THE VERY PREMATURE SKIN

Newborn care and treatment means constant interaction with the skin, so preservation of the skin integrity is a challenge. The skin of prematures is especially sensitive to external influences, so many clinical interventions that are necessary for survival of the premature newborn may damage stratum corneum. If the basal cell layer which generates the epidermis is not disrupted, the wound heals without scaring. If the basal layer is damaged, healing takes place by scar formation. It is important to monitor the integrity of premature skin (4).

Some neonatal intensive care units use emollients. Emollients decrease transepidermal losses of water and protect against microbes. Creams and ointments, paraffin and other oils that decrease transepidermal water losses improve skin integrity and stabilize surface temperature without changing skin flora. However, recommendation that prevails is

the use of emollients and other ointments exclusively in cases of extreme dryness, cracking of the skin and fissures (3, 14, 23-25).

It is necessary to minimize additional skin damage by moderate use of self adhesives, tapes and electrodes. Silk tapes or paper tapes are recommended for securing probes and tubes. For coverage of the places that demand visibility, e.g., insertion of intravenous catheters, transparent polyurethane adhesives are used. Protective adhesive hydrocolloid covers with pectin are used at sites of frequent adhesions, e.g., tubes, probes and longterm contacts with medical devices such as masks and nasal catheters. These covers protect from microorganisms, stop water losses and help healing. Silicone adhesives are an example of new technologies in this area. Means that help removal of adhesives and reduce skin damage are developed but not recommended in prematures, where the use of warm water is practiced. Damaged places are covered with hydrocolloids and hydrogels (3, 12, 23, 25-27).

Limitation of bathing is recommended with avoidance of detergents until at least 2 weeks of life. Warm water and moist cotton are used in warm and draft-free environment. Due to high range differences in chemical composition of wet wipes with the risk of damage and toxicity, they are not recommended in the first few weeks of life in premature newborns (3, 28).

Waterproof features of vernix are proven. Not removing vernix after birth protects the skin of drying. Although nonremoving vernix is not standard practice, aggressive removing at first bath is not recommended. Vernix is created in third trimester of pregnancy and therefore is seen rarely in traces in very premature newborns (6, 24,29).

In antimicrobial preparations for invasive procedures, chlorhexidin solutions in alcohol are recommended at the time. Some cases of chemical burns in prematures have been reported but there is no adequate replacement so far. Rinsing with warm water as soon as possible is advisable for prevention of burns (3, 14, 30, 31).

Awareness of composition and amounts of substances in topical application including antimicrobial agents, wet wipes, ointments, creams, adhesives and covers is necessary (3, 14).

In contact with the child, it is mandatory to have clean disinfected hands and gloves when necessary (24, 25).

## SKIN "TALK"

Newborn skin gives us information about the condition. Cyanosis, pallor, redness and marbling are some of visible signs of newborn pathology. Saturation and desaturation of blood with oxygen, blood supply and blood thickness reflect on the appearance of the skin indicating the possible conditions such as congenital heart diseases, hypoxia, ischemia, anemia, hyperviscosity, bleeding, hypotension, shock, sepsis, hypothermia, hyperthermia, stress, and others. By touching the skin we can feel if it is warm, cold, dry, wet, sweaty, rough, as an additional indicator of the state of the child. Stress reactions, manipulation, pain, sound, light and fear may be reflected on the appearance and color of the skin. Additionally, emotional sweating may occur (6, 11, 33-35).

## NEUROLOGICAL ROLE

Even in extremely premature newborns, the sensation of touch is developed. Neurological system is developing and neurosensors on the skin are very sensitive, so even slightest touch may be irritating and overstimulating. Manipulations due to care and treatment, and necessary medical interventions cause pain and stress and therefore may affect migration of the neurons and longterm outcome. It has been proven that individualized development approach with minimizing stress and coupling of medical interventions in defined periods result in not just better neurological but also overall outcome. Yet, not all touches are stressful, as some stimulate neurological development and have positive input on the wellbeing of the premature baby. So-called nests that babies are kept in emulate intrauterine environment where the baby touches and pushes walls of the uterus with benefit for development. Previously addressed skin to skin care where the baby is skin to skin with the parents has benefits on neurodevelopment, state of the baby in terms of calmness and sleep organization that reflect on overall wellbeing (6, 31-35).

## CONCLUSION

Skin of the very premature newborn must be observed and treated as other organs with immature functions that are in need of our help, interventions and care. If neglected, detrimental outcome is unavoidable. Until our knowledge about the mechanisms contributing to maturation of the skin improves, therapy is directed to ensure compensation of insufficient function of immature stratum corneum. Minimizing manipulation with the premature newborn is necessary for preservation of the integrity of the skin and the entire body.

NOVČANA POTPORA/*FUNDING*
Nema/*None*

ETIČKO ODOBRENJE/*ETHICAL APPROVAL*
Nije potrebno/*None*

SUKOB INTERESA/*CONFLICT OF INTEREST*

Autori su popunili *the Unified Competing Interest form na www.icmje.org/coi_disclosure.pdf (dostupno na zahtjev)* obrazac i izjavljuju: nemaju potporu niti jedne organizacije za objavljeni rad; nemaju financijsku potporu niti jedne organizacije koja bi mogla imati interes za objavu ovog rada u posljednje 3 godine; nemaju drugih veza ili aktivnosti koje bi mogle utjecati na objavljeni rad./*All authors have completed the Unified Competing Interest form at www.icmje.org/coi_disclosure.pdf (available on request from the corresponding author) and declare: no support from any organization for the submitted work; no financial relationships with any organizations that might have an interest in the submitted work in the previous 3 years; no other relationships or activities that could appear to have influenced the submitted work.*

## REFERENCES

1. Moore KL, Persaud TVN. The intugmentary system In: Moore KL, Persaud TVN,editors. The developing human. 7th ed. Philadelphia: Saunders; 2003:485-502.2.
2. Carlson BM. Integumentary, skeletal and muskular systems In: Carlson BM, Editor. Human embriology and developmental biology. 3rd ed. Missouri:Mosby; 2004:173-207.
3. Taeusch HW, Ballard RA, Gleason CA. Newborn skin: Development and basic concepts In: MacDonald MG, Mullet MD, Seshia MMK, editors. Avery's Neonatology, Pathophysiology & Management of the Newborn. 6th ed. Philadelphia, Baltimore, New York, London, Buenos Aires, Hong Kong, Sidney, Tokyo: Lippincott Williams and Wilkins; 2005:1471-82.
4. Rutter N. The Dermis. Semin Neonatol. 2000;5:297-302. doi:10.1053/siny.2000.0016
5. Visscher MO. et al. Vernix caseosa in neonatal adaptation. J Perinatol. 2005;25:440-6. doi:10.1038/sj.jp.7211305
6. Fluhr JW. et al. Functional skin adaptation in infancy – almost complete but not fully competent. Experiment Dermatol. 2010;19:483-92. doi: 10.1111/j.1600-0625.2009.01023.x.
7. Hoeger PH, Enzmann CC. Skin physiology of the neonate and young infant: a prospective study of functional skin parameters during early infancy. Pediatr. Dermatol. 2002;19:256-62. doi:10.1046/j.1525-1470.2002.00082.x
8. Chiou YB, Blume-Peytavi U. Stratum corneum maturation. A review of neonatal skin function. Skin Pharmacol Physiol. 2004;17:57-66. doi:10.1159/000076015
9. Fluhr JW. Infant epidermal skin physiology: adaptation after birth. Br J Dermatol. 2012;166:483-90. doi:10.1111/j.1600-0625.2009.01023.x
10. Youseff W, Wickett RR, Hoath SB. Surface free energy characterization of vernix caseosa. Potential role in waterproofing the newborn infant. Skin Res Technol. 2001;7:10-11. doi: 10.1034/j.1600-0846.2001.007001010
11. MacDonald MG, Mullet MD, Seshia MMK. Physical assesment and classification In: MacDonald MG, Mullet MD, Seshia MMK, editors. Avery's Neonatology, Pathophysiology & Management of the Newborn. 6th ed. Philadelphia, Baltimore, New York, London, Buenos Aires, Hong Kong, Sidney, Tokyo: Lippincott Williams and Wilkins;2005:326-50.
12. Vander AJ, Sherman J, Luciano DS. Regulation of organic metabolism, growth and energy balance In: Human physiology. 5th edition, McGraw Hill, 1990:553-600.
13. MacDonald MG, Mullet MD, Seshia MMK. Thermal regulation In: MacDonald MG, Mullet MD, Seshia MMK, editors. Avery's Neonatology, Pathophysiology & Management of the Newborn. 6th ed. Philadelphia, Baltimore, New York, London, Buenos Aires, Hong Kong, Sidney, Tokyo: Lippincott Williams and Wilkins; 2005:445-57.
14. Cloherty JP. et al. Skin care In: Cloherty JP, Eichenwald EC, Hansen AR, Stark AR, editors. Manual of neonatal care. 7th ed. Philadelphia, Baltimore, New York, London, Buenos Aires, Hong Kong, Sidney, Tokyo: Lippincott Williams and Wilkins; 2012:831-9.
15. MacDonald MG, Mullet MD, Seshia MMK. General care In: MacDonald MG, Mullet MD, Seshia MMK, editors. Avery's Neonatology, Pathophysiology & Management of the Newborn. 6th ed. Philadelphia, Baltimore, New York, London, Buenos Aires, Hong Kong, Sidney, Tokyo: Lippincott Williams and Wilkins; 2005:351-61.
16. Laptook AR. Temperature management in the delivery room. Semin Fetal Neonatal Med. 2008;13:383-91. doi:10.1016/j.siny.2008.04.003
17. McCall EM. et al. Interventions to prevent hypothermia at birth in preterm and/or low birtweight babies. Cochrane database Syst Rev. 2005:(1):CD004210. doi:10.1002/14651858.CD004210. pub3
18. Caroll PD. et al. Use of polyethylene bags in extremly low birth infant resuscitation for the prevention of hypothermia. J Reprod Med. 2010;55:9-13.
19. Deguines C. et al. Variatioms in incubator temperature and humidity management: a survey of current practice. Acta Paediatr. 2012;101:230-5. doi:10.1111/j.1651-2227.2011.02492.x
20. Kim SM, Lee EY, Chen J, Ringer SA. Improved care and growth outcomes by using hybrid humidified incubators in very preterm infants. Pediatrics. 2010;125:135-45. doi: dx.doi.org/ 10.1542/peds.2008-2997
21. Agren J, Sjörs G, Sedin G. Ambient humidity influences the rate of skin barrier maturation in extremely preterm infants. J Pediatr. 2006;148:613-7. doi:dx.doi.org/10.1016/j.jpeds. 2005.11.027
22. Baley J. Skin-to-skin care for term and preterm infants in the Neonatal ICU. Pediatrics. 2015;136:596-9. doi:10.1542/peds.2015-2335.
23. Soll RF, Edwards WH. Emollient ointment for preventing infection in preterm infants. Cochrane database Syst Rev. 2000;(2):CD00150. doi:10.1002/14651858.CD001150
24. Verklan MT, Walden M. Neonatal Dermatology In: Neonatal Intensive care Nursing. 3rd ed. Philadelphia:Elsevier Saunders; 2004:893-912.27.
25. Kenner C, Lott JW. Surgical care In: Neonatal nursing. 3rd ed. Philadelphia:Elsevier Saunders; 2004:386-97.
26. Denyer J. Reducing pain during the removal of adhesive and adherent products. Br J Nurs. 2011;20:30-5.30.
27. Fox MD. Wound Care in the neonatal intensive care unit. Neonatal Netw. 2011;30:291-303. doi: 10.1891/0730-0832.30.5.291.
28. Visshcher M. et al. Skin care in the NICU patient: effects of wipes versus cloth and ware on stratum corneum integrity. Neonatology. 2009;96:226-234. doi: 10.1159/000215593
29. Vissher MO. et al. Neonatal skin maturation-vernix caseosa and free amino acids. Pediatr Dermatol. 2011;28:122-32. doi: 10.1111/j.1525-1470.2011.01309.x.
30. Bringue Espuny X. Soria X, Solé E et al. Chlorhexidine-methanol burns in two extreme preterm newborns. Pediatr Dermatol. 2010;27:676-8. doi: 10.1111/j.1525-1470.2010.01178.x
31. Upadhyayula S. Safety of anti-infective agents for skin preparation in premature infants. Arch Dis Child. 2007;92:646-7. doi: 10.1136/adc.2007.117002
32. Cloherty JP. et al. Assesment and treatment in the immediate postnatal period u: Manual of neonatal care. Lippincott Wialliams and Wilkins, 7th edition, 2012:91-102.37.
33. Hutchon B. Neonatal Individualized Developmental Care and Assesment Programme NIDCAP – an overview In: Poglavja iz neonatologije: Vedenjski vzorci novorojenčka v luči zgodnjega razvoja. Narodna in uiniverzitetna knjižnica Ljubljana. 2008:63-8.
34. Munsters J. et al. Skin conductance measurements as pain assesment in newborn infants born at 22-27 weeks gestational age at different postnatal age. Early Hum Dev. 2012;88:21-6. doi:10.1016/j.earlhumdev.2011.06.010
35. Hellerud BC. Skin conductance and behaviour during sensory stimulation of preterm and term infants. Early Hum Dev. 2002;70:35-46. doi: dx.doi.org/10.1016/S0378-3782(02)00070-141.

SAŽETAK

# Koža vrlo nedonošenog novorođenčeta – fiziologija i skrb

S. Anić Jurica, A. Čolić, S. Gverić-Ahmetašević, D. Lončarević., B. Filipović-Grčić, J. Stipanović-Kastelić, A. Rešić

*Koža je multifunkcionalan organ. Ima zaštitnu, regulacijsku i senzornu funkciju. Koža vrlo nedonošenog novorođenčeta nepotpuno je razvijena i smanjene funkcionalnosti, stoga je treba shvatiti kao nezreli organ koji zahtijeva posebnu njegu i liječenje. Primjerena prevencija i kompenzacija gubitaka vode i topline obvezna je kao i očuvanje integriteta kože a time i cijelog organizma.*

**Ključne riječi:** neonatalna jedinica intenzivnog liječenja; nedonošenost; fiziologija kože