HYPOTHESIS

Medical aspects of ablution and prayer

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Abstract

Brain is protected from thermal damage by a so-called radiator system: the brain cooling system. As the brain gets hotter, the veins of this radiator system bring in cool blood from the evaporating surfaces of skin and craniofacial cavities. The craniofacial regions important in brain cooling system are very similar to the regions washed or wetted with ablution. So washing the face, oral and nasal cavities, and wetting scalp, ears and nape 4-5 times a day help the brain to remain cool throughout the day. This obviously means that with ablution cooler the head, healthier the brain. However, when a person is erect, the basal surface of the brain is in close contact with the cranial bones and therefore cerebrospinal fluid (CSF) could not cool the basal parts of the brain in erect position. Of course the relations of CSF to the skull and the brain are reversed when a person stoops (such as bowing and prostrating) allowing the CSF to intervene between the brain and the skull. Therefore stooping (as Muslims do about 120 times a day with prayer) would be beneficial for cooling the brain entirely by providing the CSF to wash-up the basal parts of brain. As for the other benefits of prayer, grounding is another aspect which provides a basis that restores and maintains natural electrical contact between the human body and the earth.

BRAIN COOLING SYSTEM

Brain is protected from thermal damage by a so-called radiator system: the brain cooling system. When human is under heat stress, high brain temperature triggers brain cooling system under the control of autonomic nerves, which will reduce brain temperature [1]. That’s important since a slightly overheated brain can bring on convulsions, fainting, and brain damage. Two kinds of veins and a number of craniofacial cavities are the major components of this system. As the men get hotter, the veins of this radiator system bring in blood that is cooled as its heat radiates away through evaporation of water (sweat or mucus) from the surfaces of skin and craniofacial cavities [1]. Activation of brain cooling system thus protects the brain from thermal damage.

Components of brain cooling system in human

Emissary and angular veins, nasal cavity, paranasal sinuses and tympanic cavity are the major components of brain cooling system in humans.

1) Emissary veins: Emissary veins connect the intracranial veins with veins outside the cranium related to nasal cavities (nostrils), scalp (top of the head), posterior auricular region (outside of the ears) and nape (back of the neck) [2]. These emissary veins serve as pathways through which cool blood from the evaporating surfaces of the head could flow into the cranium and cool the brain under the control of autonomic nerves [3].

2) Angular vein: The angular vein which drains blood from the eye, the nose, and the lips forms a route to the brain for the cool venous blood returning from the evaporating surfaces of the nasal mucosa, lips and eye corners [1, 2]. Fig.1 shows the craniofacial regions contributing to cooling the brain with emissary and angular veins.

3) Nasal cavity and paranasal sinuses: Evaporative heat dissipation from the upper respiratory tract is known to be a significant source of heat loss during hyperthermia [4, 5]. The evaporation of water at the mucosal surfaces of the nasal turbinates makes the venous blood cooler for brain [6-9]. The paranasal (frontal, ethmoid, maxillary and sphenoid) sinuses which are mucosa-lined airspaces within the bones of the face and skull also form an important component of the brain cooling system [10]. The cooling occurs through convection process caused by evaporation of mucus and the transfer of the cool venous blood from paranasal mucous membranes to the brain [11]. The rostral base of the brain is also cooled by conduction to the nearby paranasal sinuses [12, 13].

4) Tympanic cavity: The tympanic cavity communicates with the nasopharynx via the auditory tube which allows air to enter and leave the tympanic cavity, whereas it is in close contact with the middle cranial fossa and the internal carotid artery [2]. These anatomical arrangements provide an important basis for cooling the adjacent brain lobes and cranial vessels by either conduction or convection.

The blood destined for the brain is cooled by these evaporating surfaces of the head [14, 15]. Such vascular arrangements allow a bulky transfer of venous blood from the skin of the head and from nasal and
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paranasal mucous membranes to brain and provide an excellent anatomical basis for the brain cooling system caused by evaporation of sweat or mucus [11]. This cooling system protects the brain from overheating and its efficiency is increased by evaporation of water on the head and by ventilation through the nose [16]. Temperature changes are then transmitted to the cerebrospinal fluid (CSF) compartment which in turn influences the brain temperature directly or indirectly [11]. The cooler CSF washes the walls of the brain and the brain temperature decreases. Thus the concept of brain cooling system implies that the CSF takes up heat from the warmer brain and transfers it to the cooler blood in the veins. So the anatomical arrangements in human provide favorable conditions for the transfer of heat from the whole brain to the skin of the head, tympanic cavity and upper respiratory tract [1].

**POSITIVE EFFECTS OF ABLUTION AND PRAYER ON BRAIN HEALTH**

Daily prayer is the cornerstone of religious practice in Islam. The one who wants to establish these prayers must be physically clean with ablution. Ablution is required before all prayers and needs to be refreshed after sleep and any waste is excreted from the body [17]. Ablution is quite a simple procedure and its craniofacial aspects are performed as detailed below:

- Rinse the mouth out three times,
- Rinse the nostrils with water three times,
- Wash the face from the forehead to the chin, and from the ear to ear three times
- Using wet hands, rub them over the top of the head starting at the forehead, wiping backwards
- Using wet fingers, wipe the inside and outside of the ears, and the nape (back of the neck).

One can easily notice the similarity between the craniofacial regions important in brain cooling system and the regions washed or wetted with ablution (Fig. 1). So washing the face, oral and nasal cavities, and wetting scalp, ears and nape 4-5 times a day help the brain to remain cool throughout the day. This obviously means that with ablution cooler the head, healthier the brain. Therefore wetting the evaporating surfaces of the head drained by emissary and angular veins (scalp, face, nape, ears, mouth and upper respiratory tract) several times a day would be beneficial for cooling the brain entirely. The report that wet hair in cold weather may cause sinus headache and posterior eye pain supports our view about the beneficial effects of ablution for brain cooling system [16]. Nasal, instead of mouth breathing must also be encouraged for keeping the brain cool [1, 17].

As the brain is slightly heavier than cerebrospinal fluid (CSF), the basal surface of the brain is in close contact with the cranial bones in the floor of the cranial cavity when a person is erect. In this position CSF is not present between the inferior parts of brain and the cranial bones. Hence CSF normally cools the superior part of the brain and brain cooling system could not be implemented for the basal parts of the brain in erect position [1, 2]. Of course the relations of CSF to the

![Image](image_url)

**Figure 1.** Craniofacial regions important in selective brain cooling. The blood destined for the brain is cooled by these evaporating surfaces of the head. Notice that the same areas are washed or wetted in ablution.
skull and the brain are reversed when a person stoops (such as bowing and prostrating) allowing the CSF to intervene between the brain and the skull [19]. So the physical movements during prayer provide the CSF to wash-up the basal parts of brain. Therefore stooping (as Muslims do about 120 times a day with prayer) would be beneficial for cooling the brain entirely.

Other positive effects of prayer on human health
As for the other benefits of prayer, earthing or grounding is another aspect which must be considered. The surface of the earth possesses a limitless and continuously renewed supply of free or mobile electrons as a consequence of a global atmospheric electron circuit [20] and it is suggested that barefoot or hand contact with the earth (earthing) promotes health by stimulating the migration of charges into the body [21]. The beneficial effects of earthing may be a result of direct earth connection with palmar and plantar Merkel nerve endings which enables both diurnal electrical rhythms and free electrons to flow from the earth to the body [22-24]. Wearing shoes with insulating soles has disconnected most people from the earth’s electrical rhythms and free electrons [20]. In situations where going barefoot on the earth is impractical, putting hands (palms) on earth as Muslims do about 80 times a day with prayer (with a continuous plantar contact on earth for 60 minutes) provides a basis that restores and maintains natural electrical contact between the human body and the earth [23].

In conclusion, as the cornerstone of religious practice in Islam, daily prayer with ablution has positive effects for both brain and body health through brain cooling system and grounding.

REFERENCES


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