

LIVING WITH SENSORY LOSS

Topical texts on
vision, smell and taste, hearing and touch
as it relates to aging.

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National Advisory Council on Aging

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FOREWORD

The Writings in Gerontology Series is intended as a vehicle for sharing ideas on topical issues related to the quality of life of seniors and the implications of an aging population. It is produced as part of the National Advisory Council on Aging's mandate to publish and disseminate information and to stimulate public discussion about aging.

The Council endeavours to ensure that the articles in the series provide useful and reliable information. Most of the texts are original manuscripts. Some are written by Council staff, others by experts in their fields.

This series is addressed to seniors and the people who care about their well-being. It is hoped that readers will find the Writings useful.

The council welcomes comments on the topics selected as well as on the content of the articles.

Susan Fletcher
Director
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PREFACE

Many seniors suffer from sensory impairments. Their ability to live independently in the community is jeopardized by these losses. These observations were made by the National Advisory Council on Aging (NACA) during a national consultation held in 1988-89 on the barriers to independent living faced by seniors and were the impetus for this series of in-depth papers on sensory loss. Essentially, NACA thought it was important and timely to inform seniors and those who care for them on how to deal with physical changes that can affect their lives profoundly.

Sensory loss can have serious repercussions on many aspects of daily life. Seniors with moderate-to-serious impairments in vision, hearing, touch, smell or taste run the risk of being isolated from social contacts, of being deprived of needed services and information and of being denied the deeply satisfying experiences that make life worthwhile--seeing a sunset, hearing laughter, smelling and tasting a good meal and feeling an affectionate touch. Personal safety is compromised too.

The following papers are intended to provide information regarding the sensory changes that normally occur with aging as well as those associated with particular disease conditions--what they are, when and why they occur and how they can be recognized. The authors of these texts also describe strategies to help seniors cope with sensory impairments.

The Council thanks the following contributing authors for their thorough and informative texts:

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% Diane Saulnier, Director of Nursing, Côte-des-Neiges Hospital. Ms. Saulnier is a registered nurse. She obtained her Master's Degree of Sciences in 1989 from the University of Montreal. Her thesis addressed the subject of the effects of touch on elderly patients. The hospital where she currently works specializes in geronto-geriatrics.

The Council also thanks Professor Chris Armstrong-Esther of the School of Nursing, University of Lethbridge who kindly reviewed the papers and provided useful comments.

Finally, I wish to make special mention of Francine Beauregard, NACA's Chief of Projects, Education and Communications, and Louise Traversy, Communications Officer, for the editing of these papers. Carole Cloutier deserves many thanks as well for typing, re-typing and formatting this publication.

I am pleased to be associated with this Writing in Gerontology. I hope that the readers of these papers will find much valuable information to help them understand and cope with sensory impairments in later life.

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LIVING WITH SENSORY LOSS:

VISION

by

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March 1990
National Advisory Council on Aging

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INTRODUCTION

The old saying "things just aren't the way they used to be" typically presents the notion of an ever-changing society. An alternative interpretation of this phrase suggests that individuals are also ever-changing. As individuals grow older, the acuity of their senses diminishes. An inevitable fact of life is that the quality of one's eyesight also changes. These changes are often part of normal aging, a slow gradual process. The subtle changes usually occur at approximately 40 years of age. You may not recognize any difference in your vision, but you might notice that you need to hold the newspaper further away to read it. Other signs of failing vision include experiencing "double vision" or "haloes" around bright lights or "floating spots" as well as pain in your eyes (Rosenbloom et al., 1987).

Failing vision, like declines in the other four senses (hearing, touch, taste and smell) is an area that can dramatically change an individual's ability to perform activities of daily living independently. In fact, older adults may be challenged with multiple sensory deficits. These additional deficits may have gone undetected, but the loss of vision can amplify other sensory deficits which may make rehabilitation and re-training of other senses more difficult.

This paper addresses a variety of issues related to vision loss: its prevalence among older Canadians, the major causes and the early warning signs, and how vision loss can affect a person and social support networks (family and friends). It also includes a variety of helpful hints for coping with vision loss.

1. THE PREVALENCE OF VISION IMPAIRMENT

The availability of data on blindness and visual impairment has been limited to statistics of those who are registered "legally blind" with The Canadian National Institute for the

Blind (CNIB). Even though the data for this population are comprehensive, they do not include the thousands of unidentified people-that are "functionally visually impaired", i.e. individuals whose eyesight impedes their activities of daily living.

Data from the Health and Activity Limitation Survey (HALS) explored the type and degree of health limitations experienced by Canadians. The preliminary findings indicated that approximately 10% of people over 65 had a serious visual impairment that restricted their activities of daily living (Statistics Canada, 1988). This translates into nearly 300 000 blind or visually-impaired seniors.

It is estimated that less than 20% of the visually-impaired population is totally blind or without the presence of usable, residual vision. "Legal blindness" is a term used to identify the eligibility for specific government programs and benefits. It is defined as a visual acuity in both eyes with best corrective lenses of 20/200 or when the greatest diameter of the field of vision in both eyes is less than 20 degrees (CNIB, 1988).

You may be wondering if the prevalence of vision impairment differs across age groups. The answer is a definite yes. CNIB's 1988 statistics for its total client population show that the age group 0-29 accounts for 12.7% of that population, the 30-59 age group accounts for 19.9% while the vast majority--65.9% of the clients--are over 60 years old. It is clear that vision loss is associated with the aging process. An examination of CNIB's statistics for new clients registered in 1988 reveals that a growing proportion of the client population is over 60 years old: 0-29 accounts for 11.2% of the population, 30-59 represents 12.9% and the 60+ age group represents 75.5%. As we approach

the 21st century, the proportion of clients aged 60+ will continue to grow. It is also worth noting that more than half of the senior clients are aged 80+. This is no doubt a consequence of the "seniors boom" and will continue to influence CNIB's client population and service provision.

Not surprising is the fact that many residents in long-term care facilities are visually impaired. In some cases, as many as 40% of the residents are visually impaired (Horowitz, 1989). However, with the introduction of a proactive health and social service system, emphasizing community care (maintaining individuals in their own homes) rather than institutionalization, a greater number of blind and visually-impaired persons will remain in their own homes and will require support services. This will continue to present a challenge to the CNIB and other human service organizations.

2. THE LEADING CAUSES OF VISION LOSS AMONG THE ELDERLY

Vision loss is a personal thing. Each individual "sees" differently even though he or she may have the same eye condition as someone else. Some vision problems can occur gradually while others happen suddenly without warning.

Vision loss in the older adult population is, in the majority of cases, caused by one of the following: macular degeneration, cataracts, glaucoma and diabetic retinopathy. Note that an eye condition such as cataracts affects a greater number of people but does not necessarily result in "legal blindness".

2.1 MACULAR DEGENERATION

The leading cause of blindness/visual impairment in Canada is "macular degeneration". It accounted for 45% of all new cases of vision loss in the most recent year for which statistics are

available (CNIB, 1988). The centre of the person's field of vision blurs and detail is lost. More specifically, within the eye, near the centre of the light-absorbing retina, is a small and sensitive area called "the macula". Big as the head of a pin, the macula processes the details in the central part of the image and the brain receives this message. The macula needs light to work effectively and works best in daylight. Degeneration of the macula often occurs over a few years and seems to be a part of the normal aging process. Sometimes, it occurs more quickly.

Macular degeneration may also be linked to infection, high blood pressure or arteriosclerosis. Since so little is known about the basic causes of macular degeneration, effective treatment is not possible in 90% of cases (Canadian Ophthalmological Society, 1988).

2.2 CATARACT

A cataract is a clouding of the eye's lens which scatters or disturbs the passage of light, resulting therefore in blurry vision. We know that cataracts are most often associated with aging. In fact, almost half of the population aged 65+ have some degree of clouding or cataract formation. A small percentage of seniors are registered "legally blind" with the CNIB as a result of cataracts--approximately 6% (CNIB, 1988). There is no pain or redness; people may find lights close to their eyes dazzling or not bright enough. Often they see double images or "ghosts" and eyeglasses do not help.

Cataracts are caused by a chemical change in the lens itself. The reason for this change is not completely understood.

It is important to note that treatment is an operation- cataract surgery--which is now considered a routine procedure and

restores sight in over 95% of cases where there are no other eye conditions present. People of all ages can experience successful cataract surgery (Canadian Ophthalmological Society, 1988).

2.3 GLAUCOMA

Glaucoma is often referred to as "the sneak thief of sight". This eye condition is caused by a disturbance in the optic nerve associated with an increase in pressure on the inside of the eye due to a buildup in fluid. It is usually a slow, painless process for 95% of the elderly who have glaucoma. Warning signs may not be easy to detect, but may include a difficulty in adjusting eyes to a darkened room, blurred or foggy vision and/or focus that fluctuates. Occasionally it can be a sudden, acute onset. The symptoms of acute or sudden glaucoma include the loss of peripheral (side) vision, cloudy vision, as well as pain in and around the eyes. Eyeglasses will not correct these problems.

A glaucoma test should be done at the time of a regular eye examination, especially for people aged 35+. A test of intraocular pressure will detect glaucoma. If it is detected, treatment should start before symptoms develop. To date, approximately 7% of the registered blind senior Canadians are affected by glaucoma (CNIB, 1988).

2.4 DIABETIC RETINOPATHY

Diabetic retinopathy is one of the circulatory problems associated with diabetes. It is an eye condition which causes changes in the blood vessels that nourish the eye. The particular type of diabetes that a person has does not seem to determine whether he/she will be affected. Some people with mild diabetes, controlled by diet, may lose their sight whereas others who have severe forms of diabetes and are insulin-dependent never experience vision loss. Those at greatest risk are people who

have had diabetes for over 15 years. Diabetic retinopathy goes through several stages and may lead to total blindness.

During the initial stages, one's sight will blur and fluctuate, and floating spots will be seen. In the later stages, one's visual field gradually reduces because of scar tissue which may pull on the retina and detach it, resulting in total blindness. Laser treatment in the early stages has proven to be successful in many cases.

Recognizing that the medical and technological advances in the treatment of diabetes has resulted in an increased life expectancy, diabetic retinopathy, therefore, might become more commonplace among the elderly (CNIB, 1987).

3. THE IMPACT OF VISUAL IMPAIRMENT

3.1 ON INDIVIDUALS

The total loss or serious impairment of a person's eyesight typically elicits reactions of anger and resentment. The loss of vision may happen quite suddenly, as the result of an accident or disease; or it may be a slow, lingering deterioration as in the case of glaucoma or diabetes. Nonetheless, it has been described as the "death" of the sighted person. This can be a destructive blow to an individual and is often accompanied with an array of personal losses.

For older adults that have always been oriented to a world of visual cues, much of their world and "who they are" is damaged. Their functional ability to perform activities of daily living is in chaos and their personality may also be affected. How the loss of sight will affect a person, understandably, differs from person to person. Loss of sight may lead to a loss of basic skills (mobility and activities of daily

living), loss of ease in communication (oral, written and visual), loss in the ability to appreciate (the pleasurable, leisure and beauty), fears about financial difficulties and the loss of personality (social adequacy, self-esteem, obscurity) (Carroll, 1961). The degree and range of losses all influence the individuals grieving for their vision. Considering the many aspects of a person's psychological security, we may be able to appreciate how far-reaching the consequences of vision loss are. As well, an individual's sense of belonging may be at risk since the individual may see himself/herself as "abnormal" in a society that emphasizes physical perfection; being blind in a sighted world may be very alienating. The emotions associated with any of these losses may lead a person to become more anxious, withdrawn, lonely, or depressed; it can manifest itself into any number of behaviours.

With social support networks and rehabilitation services, it is hoped that the grieving individual will understand that life is not over, but rather that life has changed and a new life has begun.

Many of the losses discussed earlier can be restored simply by adapting one's activities. Learning to develop other senses and integrating new skills and techniques in activities of daily living may optimize the independence and psychological well-being of an individual.

3.2 ON FAMILY AND FRIENDS

Family and friends can play an integral supportive role during the visually-impaired person's adjustment period, but let us not forget that they themselves are experiencing losses and are in an adjustment period. It is important for the social support network to realize that the visually-impaired person may need some assistance with some activities. It is just as

important for family and friends to realize that their visually impaired friend or loved one may be capable of completing an activity if he/she is allowed to try. Families, friends and caregivers need to learn how to help someone help oneself.

3.3 ON THE GENERAL PUBLIC

The reaction of the general public towards blind persons may be determined by the myths and stereotyped ideas of uneducated blind people that live in institutions or work in sheltered work environments and are unable to care for themselves. Great efforts have been made to "mainstream" and de-institutionalize people who are capable of caring for themselves. Because of this "mainstream" philosophy, more rehabilitative services have emerged and fostered more independence for visually-impaired people as well as other disabled persons. Only through public education will the social- service sector be able to heighten awareness of some of the issues that surround blindness and visual impairment. The following section addresses courtesies to the blind.

4. COURTESY TO THE BLIND

Treat blind or visually-impaired persons as you would anyone else. They do the same things as you, but sometimes use different techniques.

If you are not sure how much they can see, just ask! Not all blind or visually-impaired people have total absence of sight or live in total darkness. In fact, only about 10% of CNIB's registered clients are totally blind. Many see in varying degrees--from light perception to the ability to read large print with a magnifier. Others may be able to read signs and see objects from a distance but be unaware of obstacles directly in front of them because of their restricted field of vision.

Speak to blind or visually-impaired persons in a normal tone of voice. Identify yourself and let them know you are addressing them by using their name or touching their arm. Be sure to tell them when you are leaving.

- When walking, let a blind or visually-impaired person take your arm. Pulling them by the hand is awkward and confusing.
- Do not hesitate to use the words "see", "look", or "read". Blind or visually-impaired persons use these words as often as anyone else.
- Describe your surroundings, whether it is the scenery from a moving car, an interesting incident on television or the lay-out of an unfamiliar room. Point out helpful details: "The door pulls towards us on the left" or "we are approaching the staircase that goes up."
- Give directions clearly and accurately. Pointing or using phrases such as "over there" will be of no assistance.
- Avoid the impulse to rush to a blind person's aid. If you are not sure whether assistance is needed, ask.
- Remember, when you meet a blind or visually-impaired person, the keyword is "person", not "blind".

5. SOME HELPFUL HINTS AND TECHNIQUES IN ADAPTING TO VISION LOSS

In order to determine which techniques are best, the visually-impaired person must decide for herself/himself what works best. This may result in the consistent use of one technique or a combination of techniques. The following sections list some of the components involved in coping with vision loss.

5.1 LIGHTING

Lighting needs are specific to each person's visual impairment. The most frequent problem is that lighting is either too bright, causing glare, or not bright enough. The cost of adequate lighting is minimal given the possible benefits.

- Arrange several lamps around the room to provide a more even distribution of light as opposed to one high-wattage bulb.
- When your eyes adjust from a light to a dark setting, a dimmer switch can be used to control the intensity of light in the various rooms. Alternatively, use sunglasses, i.e. leave them on or take them off when entering a building.
- Use window blinds or shades to reduce glare.
- For those who need bright light, fluorescent lights are especially useful under kitchen cupboards.
- Hang dark open-weave curtains to reduce glare from direct sunlight and still retain good natural light.
- Keep stairway well lit to reduce shadows which may distort images.
- When travelling outside, a wide brim hat, sun visor, or sun glasses may assist in reducing glare.
- Work with the light source behind your left shoulder for best use of light.
- Note that matte surfaces are beneficial if glare is a problem. Do not keep a polished floor; use mats/carpeting to reduce glaring areas. Also avoid using furnishings that contain highly reflective materials such as metal and glass.

- A flashlight or pen-light can be of assistance when trying to read in an area that is too difficult to keep well lit.

5.2 COLOUR-BRIGHTNESS CONTRASTING

Colour-brightness contrasting is often an attractive, inexpensive technique that can be extremely beneficial for people with vision loss. It can be particularly helpful in identifying objects and details.

- Dark colours tend to absorb light and light colours reflect light. Therefore, if rooms are too dark, paint the walls a light colour and hang light-coloured drapes. A dark open-weave drape may allow light to enter but still reduce glare.
- A dark-coloured bathmat over the side of a light tub will clearly identify the edge.
- For stairs, handrails should lead out and extend beyond the top and bottom step to assist in identifying the plateau. In addition, the handrail and the edge of each step should be of a contrasting colour for easy identification.
- A change in the colour of the floor at the top and bottom of a flight of stairs will also assist in identification.
- Use coloured tape on the head of a key so it can be easily identified. Coloured tape can also be placed beside wall switches and electrical outlets so they can be readily visible when they are the same colour as the wall.
- Colour-brightness contrast can help the visually-impaired person to locate furniture easily. For example, place a cloth of a contrasting colour on the back of a dark chair. This colour contrast can be a useful decorative feature.

5.3 MEALS AND FOOD PREPARATION

With imagination and the consistent use of practical techniques, meals and food preparation does not have to be a frustrating event.

- Use light-coloured dishes on a darker or contrasting tablecloth, or vice versa.
- Similarly, display food of a light colour on a dark-coloured plate, and vice versa. Stay away from transparent or patterned dishes.
- The placement and distribution of food on a plate can be described by using the "clock" method, i.e. "potatoes at 2 o'clock, mixed vegetables at 8 o'clock, etc." Note that meat or difficult-to-cut items should be placed at 6 o'clock for easier access and better control.
- The "clock" method can also be used to describe where certain items are on the table, for example, a glass of water, salt and pepper. Setting the table in a consistent manner is helpful.
- Place a baking dish on a rimmed cookie sheet to catch any drippings. This reduces oven cleaning and makes it easier to locate the baking dish.
- Use a slicer for hard-boiled eggs--instead of a knife--to cut items such as mushrooms and cheese.
- A muffin tin is great for baking potatoes or tomatoes. It is easier to locate a muffin tin than individual items.
- Use a cake pan under a measuring cup when measuring liquids. This prevents wasting excess liquid.

- Foods can be identified by the consistent placement of items, by smell, sound, and packaging without labelling each item individually. It may be helpful to label items such as spice jars and canned foods by using a large piece of tape that has the name of the contents written in large dark lettering or by using tactile magnetic letters, e.g. "P" for "peas". To label canned goods, the use of reusable index cards with large print writing, attached by elastic bands is another easy adaptation.
- When labelling an oven, the use of "Hi marks", a tactile identification, is the best solution in order to identify significant points around the oven dial. This adaptation is available through the CNIB.
- For food preparation, use a dark surface when mixing light coloured ingredients, and vice versa. The light and dark surfaces can be done by using bowls on the counter or work area.
- Use individual measuring cups of specific sizes for each measurement. You can keep the cups together to determine the correct size of each, or put a notch in the handle, i.e. 1 notch equals 1 cup, 2 notches equal $\frac{1}{2}$ cup and so on.

5.4 TIPS ON TRAVELLING AND MOVING ABOUT

Travelling on your own is one component of maintaining independence. Remembering some of the techniques outlined below will allow travelling more confidently.

- Plan exactly where you are going and the best, safest route to take. Think of landmarks that are easily recognizable to assist you in keeping your bearings.

- When travelling with a sighted friend, hold on to their elbow and walk about half a step behind them. This allows you to follow them with great ease.
- When travelling on a bus, ask the driver to call your stop, and try to sit close to the driver to ensure that you hear your street being called.
- Use a white cane. More details on specialized mobility training are available from the CNIB.
- To avoid running into doors, always leave them either completely open or closed. A half-open door is dangerous. The same holds true for cupboard doors.
- Make sure that furniture is returned to its consistent location. For example, push chairs under the table.

5.5 LIFESTYLE TIPS

When maintaining relationships and independence, you may need to utilize community services, the assistance of family and friends and specialized devices.

- When entering a room with a friend, ask to be told who is in the room, and if desired and appropriate, ask to be introduced.
- Talking books are available from the CNIB and often, through public libraries.
- Ask the bank teller or cashier to separate your bills so you can identify them.
- Make use of writing guides, signature guides, large print telephone dials and operator assistance.

5.6 LOW-VISION AIDS

It is important to make the most of the sight you do have. Therefore, the use of low vision aids may help you maximize your remaining vision.

- A complete low-vision examination at a Sight Enhancement Centre may be useful. An eye-care specialist may recommend low-vision aids such as handheld magnifiers, bar magnifiers (they easily magnify a line of print), closed circuit TV readers (they magnify up to 45%) and magnifiers with a light attachment.
- other useful low-vision aids include: large print telephone dials and/or large print push-button attachments; magazines and books in large print, braille or recorded on cassette tape; and adapted leisure items and board games, such as playing cards, scrabble, bingo cards, checkers, backgammon and monopoly.

CONCLUSION

Vision does deteriorate with aging. Vision loss among the elderly can be caused by a variety of factors, particularly macular degeneration, cataracts, glaucoma and diabetic retinopathy. The impact of visual impairment can be serious for individuals, family and friends, and the general public. The visually-impaired person can benefit from various aids, tips and techniques, as well as information and creative understanding. Seniors with vision loss need not withdraw from the community.

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LIVING WITH SENSORY LOSS:

SMELL AND TASTE

by

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INTRODUCTION

Chronic disorders of taste and smell have been largely neglected because they are seldom fatal, and unlike deficiencies in sight and hearing, are not considered a serious handicap—they are more "nagging" problems affecting the quality of life (Schiffman, 1983). Nevertheless, declining smell and taste sensations may be a serious problem in some circumstances, for some people.

Taste and smell are also known as the "chemical senses". Their processes are complicated and as yet not completely understood; however, changes in these processes are known to occur with aging. We will discuss the role of our chemical senses in life management before describing the basic processes of smelling and tasting. The impact of aging on smelling and tasting will then be discussed. Finally, the implications of our declining chemical senses and some practical suggestions on how to deal with them will be presented.

1. THE ROLE OF OUR CHEMICAL SENSES

Both smell and taste are the primary senses that influence-- in an "integrative" fashion--the pleasure we derive from eating and as well, guide us in selecting foods; they affect our appetite and thus, are likely to affect our nutrient intake. Some of our senses are fully developed at birth. Sweets are liked and bitter tastes disliked by newborn babies. This may be an "early warning system" that prevents the intake of poisonous bitter substances and ensures the survival of the species.

Each of these senses may play a specific role in the survival process. Smell informs us of danger within a specific environment, e.g. it warns us of leaking gas and burning food, just as smoke warns us of fire. Taste is often the elementary monitor of food safety in terms of food spoilage and contamination.

2. THE PROCESSES OF SMELLING AND TASTING

Smelling and tasting are separate sensory systems, but both involve physiological and psychological experiences. The physiological component consists of the interaction of chemical stimuli originating outside the body with the receptors located inside the nose and mouth; the stimulation is passed along the nerves to the brain. There it is detected, recognized and stored in memory. The psychological phase follows, although the distinction between the two phases is difficult to make. In the psychological phase, the impression caused by the stimuli, odour or flavour, is evaluated in terms of whether it is pleasant or unpleasant. The individual "integrates" the information with that of other stimuli and acts accordingly, either by avoiding the source of the unpleasant stimuli or by seeking further exposure to the pleasant type.

While the principle of smelling and tasting is simple, the complexity begins when considering that there are numerous types of odours and flavours and that each type has its specific route to perception. Butter flavour alone consists of 27 components. Odours are even more complicated. In the real world, several stimuli interact with each other as well as with many other experiences simultaneously.

All odours are volatile substances. The process of smelling occurs when the odours dispersed in the air are transferred by air flow to the nose. The smell receptors located in the nose are cells with hairlike protrusions resembling antennae at one end and with nerve endings providing connection with the brain at the other end. Interestingly, smell sensitivity is 10,000 times greater than that of taste. Smell decreases with the onset of diseases that interfere with the receptors located in the nose cavity, i.e. colds, allergies.

The process of tasting that occurs in the mouth requires dissolving of a flavour substance in the saliva which, in turn, bathes the papillae located on the tongue. However, not all papillae are taste-oriented; some reflect sensations of pain or

texture. Four basic tastes can be differentiated--sweet, salty, sour and bitter. They are unique in their chemical structure although some bitter and sweet compounds are similar. Slight alterations may cause sweet tasting chemicals to become bitter. Small fungiform papillae, resembling mushrooms, contain taste buds sensitive to sweet and salty tastes mainly. Much larger round papillae register bitter tastes. Each taste bud incorporates about 50 receptor cells whose life span averages about ten days. They are constantly renewed and their number varies from person to person.

The interaction between the flavour substances and the taste buds depends on the mouth environment, such as the acidity or alkalinity of the saliva. This is not necessarily locally determined but may be the result of metabolic processes. Our study of the effect of medication on taste showed that salicylic acid formed from acetylsalicylic acid (ASA)--commonly known as aspirin--is found in saliva in an amount corresponding to two percent of that found in the blood. This affected responses to sour foods. But even people who did not take aspirin had small amounts of salicylic acid in their saliva, probably from some foods, toothpastes and mouthwash.

There are individual differences in taste acuity. Genetic taste-blindness is known to exist to a bitter compound called PTC, phenylthiocarbamide, a compound whose chemical structure is similar to the structure found in substances responsible for the bitter components present in vegetables such as cabbage, cauliflower and Brussels sprouts. About one third of Caucasians and one tenth of Asians are PTC-non-tasters. Tasters are suspected of being "picky eaters" to a greater extent than nontasters.

Taste is negatively affected by poor dentition (having badly fitting dentures, missing teeth, cavities or no teeth),

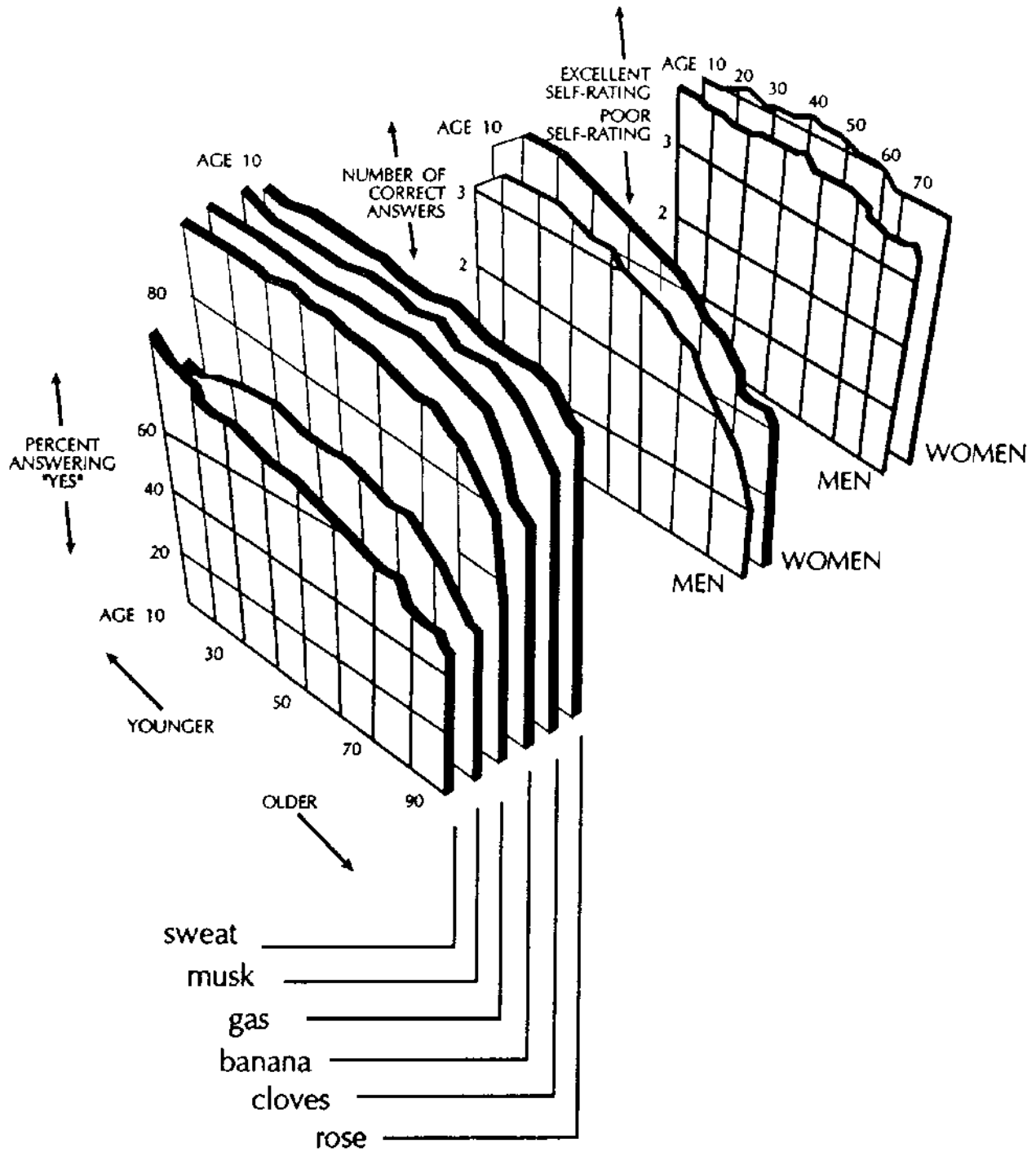
inadequate oral hygiene and lack of saliva or a change in saliva consistency. In one study, good oral hygiene improved the ability to taste saltiness by 68% (Langan and Yearick, 1976). Thicker saliva may require longer stimulation to integrate sensory information.

Psychiatric disorders and other diseases, such as cerebral tumours, are associated with changes in taste and smell. Some effects may be due to medications. Head injuries, head surgery and radiation for cancer treatment are also known to alter the chemical senses. Alterations may vary: one taste only may be affected, the taste of bitter for example, and the effect may be transient. The most common alteration is that of a decreased sense of smell. Permanent loss of smell has been documented in one percent of the population and temporary loss in 62%. Distorted sensations, sensing foul smells, having metallic taste are the most unpleasant types of smell and taste changes. Fortunately, alterations and distortions are rare; they occur with the use of some drugs, e.g. cocaine.

Both smelling and tasting are known to be adaptive processes. After prolonged stimulation, the sensitivity is decreased. Unpleasant smell may become more tolerable, as we all know. Sour food may become less unpleasant and spicy food less pungent, as Moskowitz (1975) and Rozin (1980) found out. Moskowitz observed that the fruit tamarind was rated less sour by Indian workers who ate it regularly compared to students who did so occasionally. Rozin reported that Mexicans who eat chili peppers in childhood find them less strong than visitors do.

A survey of smelling ability was conducted recently by the National Geographic magazine in co-operation with the Monell Chemical Senses Centre in Philadelphia. Responses to six odours were tested in 1.5 million respondents. (See Figure 1.)

FIGURE 1



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Graphics by: Allen
Carroll

National Geographic
Society(October 1987)

Odours ranged from pleasant to unpleasant and included rose, banana, cloves, musk, sweat and gas (Gilbert and Wysocki, 1987). Results showed a greater smelling acuity among outside workers than among office employees; perhaps their exposure to fresh air helped to maintain their smelling acuity.

3. THE IMPACT OF AGING ON SMELLING AND TASTING

"Though a wine's aroma increases with age, our ability to appreciate it does not." With most of the scents included in the National Geographic survey, a decline in detection became noticeable at about 70 years of age and was significant after 80. An exception existed with sweat scents; deficits were noted beginning in youth (Gilbert and Wysocki, 1987). Individuals of both sexes reached a peak of performance at about 20 years of age and declined thereafter.

Schiffman (1984), when comparing young and old, observed among the latter a tendency towards less intense likes and dislikes of food odours. Some of the elderly subjects were totally unable to smell food. Earlier studies reported a decline in the number of taste buds with age but a recent study of cadavers refuted this finding. While the number of taste buds differs among individuals, this is not due to aging. Degeneration is especially acute in persons with Alzheimer's disease.

Perturbed or changed taste sensitivity has been shown in many studies (Chauhan et al., 1987). Taste/smell changes lead to perceiving salt in solution as very salty among the very old and those who take diuretic drugs. These people avoided salt/sour tasting foods. Drugs acting on the gastrointestinal track had the opposite effect. Ethnic background showed an effect of adaptation to certain taste/smell stimuli (Chauhan, 1989).

In addition, one has to recognize the complexity of foods due to their many flavours, odours and other sensory attributes such as texture and appearance. Responses to taste stimuli are assessed only on single flavours--for example salt--but responses to food are much more complicated because all food flavours are composed of many chemical substances. Experiments comparing recognition of pureed foods (to control for texture) by blindfolded subjects have shown that older people take longer to identify the food and make more mistakes than younger people; the same findings resulted with smell identification.

This author has compared young and old in rating sweetness, bitterness and aroma of cooked and raw cabbage. The aged detected sweet less, bitter more and sensed aroma less than the young. Surprisingly, rating of liking was the same for young and old regardless of the perceived intensity of flavour and aroma.

The psychological aspect of smelling and tasting is very important among older individuals as it is associated with memory. Thus response to stimuli is evaluated against standards located in the memory and depends on the emotion the sensation evoked. Smell occupies a privileged place in memory because it rekindles old recollections. The following quotation from the National Geographic survey illustrates the emotional role of smell memory: "After my husband died, I would go into his closet and hug his suits because they smelled of his own smell, and aftershave. I'd stand there with eyes closed, hugging his clothes, making believe and cry."

Food memories of older persons will vary from those of the younger people. A number of major factors affected the food experiences of people born in different decades of this century. The Great Depression, World War II and food rationing are the major food experience of the old generation.

Nowadays, the impact of television and other media is becoming more and more intense and ubiquitous: new beliefs are formed that have an impact on people's decision-making processes and, consequently, on food selection. The explosion of developments in food technology also affects the food choices of old and young alike. As well, the great concern for fitness and health among all age groups interferes with the role of odour and taste in guidance of food choices.

This author's studies comparing food habits of young and old populations reflected the impact of generation differences (Krondl and Coleman, 1985). The elderly were more frequent users of jam, potatoes and bananas; the young of peanut butter, apples and lettuce.

4. THE IMPLICATIONS OF OUR DECLINING CHEMICAL SENSES

The inability to detect noxious tastes and odours can lead to poisoning. Gas companies add foul smelling compounds to their normally odourless products as warning signals; they have worked hard to develop odours that are generally repugnant. Nevertheless, some elderly individuals are unable to detect foul odours. The inability to smell repugnant substances may jeopardize safety. Impairment in smelling or tasting also may prevent detection of food spoilage and can lead to illness.

Sometimes, loss of smell can be beneficial. Individual human body odour is remarkably distinctive. Mouth odours can reflect gastrointestinal disorders and other illnesses. Urine and body odours are smelled less by old than young and thus may be less objectionable to the old. This is known to be the case from the urological wards and some nursing homes where bathing may not be as frequent as required to remove objectionable body odours. In such circumstances, decrease of smell may be an advantage to the residents but its consequences may discourage visitors.

Impaired taste may negatively affect appetite, as many sick people know. There is also a relationship between the digestive function and the ability to taste. Food flavours, for example meat flavours, monosodium glutamate (MSG) and salt, stimulate tasting and affect the salivary and pancreatic flows, gastric contractions and intestinal mobility. Taste disorders then impair digestion, interfere with food choice and may result in nutritional deficiencies. A 70-year old person may need two teaspoons of sugar in a cup of coffee to perceive the same preferred degree of sweetness that she obtained from one teaspoon at the age of 25.

Help for the elderly with taste and smell deficits may be a possibility in the future. New food fragrances have been developed, such as anise (licorice), hickory (smoked bacon), strawberry and root beer. They are intended to heighten the pleasure aspect of food by increasing the stimulation of the receptors in the nose. Greater stimulation of the emotional areas of the brain may result and increase the pleasure derived from the food.

5. SOME PRACTICAL SUGGESTIONS

Elderly persons whose smelling and tasting ability is impaired may be helped in a number of ways. Some are suggested as follows:

- Treatment of allergies and colds are important to prevent a loss of smell that would interfere with appetite and could lead to malnutrition.
- To reduce risks relative to impaired smell, it is important to utilize smoke detectors to warn of fire and carbon monoxide detectors to signal gas dangers.

- To enhance the pleasure aspects of social contacts, it is useful to care for personal hygiene, including oral hygiene and use of toiletries.
- To prevent and control taste limitations, an adequate intake of fluid for saliva formation and healthful diet as well as treatment for nutrient deficiencies such as zinc should be considered.
- To reduce impaired tastes, if dental health allows, chewing gum will increase the flow of saliva. Rinsing with long lasting sweeteners may help to cope with distorted taste. Adding simulated odours and taste enhancers will intensify smell and taste stimuli. Chewing alternate foods may also improve tasting of foods.
- The trend of a decreased tasting ability associated with aging should be recognized; the amount of sugar or salt in drinks or foods need not be unduly restricted among persons who do not require salt restriction or a diabetic diet and are generally healthy.
- Pleasure from food should be ensured by recognizing the important role of memory associations with specific odours and flavours of foods. Other sensory factors such as the appearance and texture of foods could help in tempting the appetite to compensate for diminished smelling and tasting. The excessive emphasis on eating solely for health reasons rather than for pleasure should be avoided and an individual's food preferences honoured whenever possible.

CONCLUSION

The "chemical senses"--smell and taste--are complex as we have seen. The limitations imposed by aging affect smell more than taste. Limitations do not affect detection and identification of each smell and taste stimulus equally. The decline of smelling and tasting varies among individuals. It is greater among males than females, among the sick and those dependent on medications more than among healthy individuals. Decrease in sensitivity to smell and taste can be transient and regenerative. Nevertheless, precautions should be taken against health hazards and social inconveniences due to decline especially in smelling.

Sensory stimuli can be enhanced and partly compensate for the decline in smelling and tasting. In terms of the effect of decreased smelling and tasting on food selection, it should be remembered that the liking of food is dependent also on other senses--sight and touch--and to a great deal on the memory of previous experiences. Thus, food selection is individual and has to be respected as such.

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LIVING WITH SENSORY LOSS:

HEARING

by

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INTRODUCTION

It is sometimes difficult for people to acknowledge having a hearing loss as there is still a stigma attached to wearing a hearing aid. A person may take years to ask for help. Hearing-impaired seniors thus require much support and understanding from family, friends and caregivers.

It happens that family physicians or other professionals tell hearing-impaired seniors that they must simply learn to accept hearing loss. Many people are still unaware of the dramatic improvements in hearing aids, and the fact that it is now possible to fit virtually every hearing-impaired person with an appropriate hearing aid. Many hearing aids and programs exist today. They could make easy communication possible for the hearing-impaired seniors.

Unfortunately, few aural rehabilitation services or programs are available across the nation. Very few centres have orientation classes that provide services after the hearing aid has been dispensed.

This paper looks at hearing loss among seniors, the problems and the possible solutions.

1. THE PREVALENCE OF HEARING LOSS

One of the most common chronic disabilities associated with aging is hearing loss. It is conservatively estimated that over 50% of persons aged 60+ suffer some kind of hearing loss. The incidence increases significantly with age.

Hearing screenings of over 10,000 Ontarians aged 60+, conducted by the Canadian Hearing Society (CHS) during the summers of 1985, 1986, 1987 and 1988, show an average "failure rate" of 65% for the group aged 60 to 79 and 81% for the 80+ group. These figures are in keeping with studies undertaken elsewhere.

2. THE PHYSIOLOGY OF HEARING

Hearing begins when sound waves are transmitted through the air. The outer ear acts like a funnel. It collects sounds from the air which rush along the ear canal until they bump into the ear drum, a very delicate membrane which absorbs sound energy and moves in rhythm with it. (The higher the sound, the faster the eardrum moves. The louder the sound, the bigger the size of each movement.) The ear drum moves thousands of times each second and each of these movements is transferred to a "chain" of three bones, located in the middle ear. When the ear drum moves, it causes the bones to vibrate. The vibrations are transmitted into the deepest section of the ear known as the "cochlea", a snail-shaped organ located in the inner ear which contains thousands of hair cells that receive the vibrations and move.

The hair cells can be thought of as triggers because each one is connected to a nerve cell which fires off an electrochemical impulse whenever a hair cell moves. There are many, many individual hair cells connected to many, many individual nerves, but all the nerve cells travel together to form what is called the "auditory nerve". This nerve is like a highway along which impulses travel to reach the brain.

More complex and sophisticated than any man-made computer, the brain interprets the different signals coming to it from the auditory nerve, distinguishing between different sounds, telling us if they are loud or soft, high or low, pleasant or screechy, irrelevant or loaded with meaning, such as the sound of speech. As well, the brain compares the slight differences between sounds entering the left ear to those coming through the right ear. Through this stereo or "binaural" hearing, the brain can tell us the source of a sound, for example, whether it is far or near, behind or in front, to the left or right.

Sound may also reach the ear through other routes, for example, by bone conduction through the skull, but the pathway through the ear is the most important.

3. THE TYPES, DEGREES, PREVENTIVE MEASURES AND MOST COMMON CAUSES OF HEARING LOSS

3.1 TYPES OF HEARING LOSS

Hearing loss can be due to an abnormality or disorder in the outer, middle or inner ear.

In the outer ear, wax build-up or "otitis externa" (painful infection in the ear canal) may cause a minor change in hearing, but usually does not interfere significantly with speech reception. In most cases this can be treated and cured. When a hearing loss is due to a problem in the outer ear, it is known as a "conductive loss" because the sound is not conducted properly through the outer mechanisms.

Hearing loss in the middle ear usually has a greater effect on hearing and affects the part of the ear from the ear drum into the middle ear cavity. The most common middle ear problem is an infection of the middle ear cavity known as "otitis media". This often occurs with colds, adenoiditis or tonsillitis in children. In the majority of cases, this can be cured if checked and treated promptly. Other middle ear disorders include otosclerosis, ossicular discontinuity, ear drum perforation and mastoiditis. Many of these problems can be medically or surgically treated, thereby improving the individual's hearing. If they cannot be treated medically, it may be necessary to try a hearing aid. Disorders of the middle ear also cause conductive hearing loss.

Inner ear disorders occur in the cochlea. Problems in this part of the ear are generally not curable but in most cases, the

use of a hearing aid or other amplification device can improve the hearing ability of the afflicted person. As mentioned above, the inner ear houses hair cells and nerve fibres; when damaged, they cannot be repaired or regenerated. This type of hearing loss is labelled "sensorineural" or "nerve deafness" in layman's terms. It may be due to many causes, including exposure to loud sounds, aging, heredity, german measles, meningitis, lack of oxygen at birth and exposure to drugs toxic to the ear.

Sometimes, in conjunction with a sensorineural hearing loss, the individual experiences blockage in either his or her outer or middle ear such as wax build-up or otitis media. This type of hearing loss is called "mixed loss".

3.2 DEGREE OF HEARING LOSS

The degree of hearing loss can be ascertained with a hearing test. The results are recorded on an "audiogram", that is a graph showing how sensitive a person is to various sounds. Responses to both sound frequencies and intensities are analysed.

Degree of hearing loss is classified according to the ANSI 1969 classification whereby the average threshold of the speech frequencies is used. They range from normal hearing (0-25 decibels) to profound loss (greater than 90 decibels). Generally speaking, the vowel sounds are lower in frequency than the consonant sounds. They are also higher in intensity than the consonant sounds. For example, the very faintest sound in the English language is the "th" sound, which is only just audible at about three feet. The consonant sounds such as "s", "f" and "th" are most difficult to hear. The vowel sounds "oo", "aw" and "ah" are easy to hear because they are low in pitch and strong in intensity. In short, the vowels give power or energy to speech, intelligibility is provided by the consonants. The noise levels in decibels of some common sounds are shown in Figure 1. It illustrates how common sounds can harm hearing.

FIGURE 1

SOUND LEVELS AND HUMAN RESPONSE

COMMON SOUNDS	NOISE LEVEL DECIBELS (dB)	EFFECT
Jet engine (near)	140	
Shotgun firing Jet takeoff (100-200 ft)	130	Threshold of pain (about 125 dB)
Thunderclap (near) Discotheque	120	Threshold of sensation
Power Saw Pneumatic drill Rock music band	110	Regular exposure of 110 more than 1 min. risks permanent hearing loss
Garbage truck	100	No more than 15 minutes unprotected exposure recommended
Average portable cas- sette player set above the halfway mark	?	Are you setting your volume too high? Don't play auditory suicide
Subway, motorcycle Lawnmower	90	Very annoying
Electric razor Many industrial work places	85	85 Level at which hearing damage (8 hours) begins
Average city traffic noise	80	Annoying. Interferes with conversation
Vacuum cleaner Hair dryer Inside a car	70	Intrusive. Interferes with telephone conversation
Normal Conversation	60	
Quiet office Air conditioner	50	Comfortable
Whisper	30	Very quiet
Normal breathing	10	Just audible

This decibels (dB) table compares some common sounds and shows how they rank in potential harm to hearing. Recommended exposure times are based on current research.

3.3 PREVENTIVE MEASURES OF HEARING LOSS

One cannot stop the gradual loss of hearing associated with the process of aging. However, noise-induced hearing loss is becoming more and more prevalent among younger people and will result in increased hearing loss among the elderly. The best prevention is to avoid noise hazards.

Prolonged exposure to high levels of noise can cause permanent hearing loss. The sensory cells of the inner ear, once damaged by noise, do not recover and cannot be replaced.

The onset of noise-induced hearing loss is gradual and insidious. In the early stages it may not be noticed because only the high-pitched sounds--those slightly above the main speech frequency range--are affected. With continued noise exposure, the hearing loss spreads to lower-pitched sounds and it becomes more difficult to hear and understand speech. Words then seem to run into one another, become unclear, and people sound as if they were mumbling.

Hazardous noise levels may be present if one answers "yes" to the following questions:

- Is communication so difficult that you have to shout at someone close by?
- Do your ears ring after working in the noise for several hours?
- Is your hearing "dull" after several hours of exposure to noise?

While hazardous noise levels are more common in the workplace, loud music, etc. can also cause a hearing loss. It is imperative that people of all ages avoid prolonged and regular exposure to loud noise.

3.4 HEARING LOSS IN ADULTS

There are many causes for deafness. These include ear infections, disease processes, injury, tumour, otosclerosis, drugs, interruption of the blood supply to the inner ear, noise and aging.

The aging process is the most common cause of "sensorineural impairment" (nerve deafness). The deterioration that starts around age 20 becomes increasingly noticeable with each succeeding decade. It generally affects high-pitched sounds, including many of the consonant sounds, before it affects low pitched vowel sounds. This means that the hearing-impaired person is unable to hear consonant sounds but retains the ability to hear most vowel sounds and environmental sounds (such as footsteps and traffic noise). (In other words, the speech is difficult to "understand" but not difficult to "hear".) This leads many elderly people to say, "I can hear you but I can't understand you." This type of hearing loss is called "presbycusis".

Presbycusis is usually due to a deterioration of the auditory nerve fibres in the cochlea (inner ear). Sometimes, it is associated with high blood pressure and hardening of the arteries. Exposure to an excessive amount of noise during a person's working years guarantees hearing loss as the person ages.

4. IMPACT OF THE PROBLEM

"Hearing problems have a profound influence on the lives of the elderly. The ability to communicate is frequently a deciding factor in determining a person's autonomy, independence, and overall well-being and happiness ... Society is ill-informed about the importance of speech communication and about the devastating effects of communication

difficulties, and it is ill-informed about the cost effectiveness of providing communication aids to the elderly and about the cost to society and to the individual of not providing them."

Danish Medical Bulletin,
Gerontology Supplement,
November 1986.

Hearing loss results in a communication problem which leads to other difficulties affecting the quality of life and many activities of daily living. One cannot respond appropriately to what has not been understood.

It is a frustrating and anxiety-provoking experience for all concerned. For example, co-operation in residences and with professionals such as nurses and homemakers can be inhibited. Seniors who have suffered some sensory loss often rely on the support of family members to help them cope effectively with daily life. Their disabilities can be a source of misunderstanding and potential conflict and may be perceived as a major burden on family members over time. Hearing loss taxes the patience of hearing people and can be devastating for the hearing-impaired individual who lives at home or in an institution.

Hearing-impaired persons may tend to dominate the conversation in order to guide the topic under discussion, or withdraw into isolation and loneliness as their hearing loss becomes more severe. Without the ability to receive and make full use of speech communication, they can be confused with, or mistaken for, the intellectually-impaired and diagnosed as senile.

Hearing problems often develop so gradually that they are not readily recognized as such but are sometimes presumed to be a sign of mental deterioration. The result may be withdrawal from society's mainstream by the affected individual. Lack of communication may result in emotional problems ranging from

paranoia to depression or loneliness (Ontario Advisory Council on Senior Citizens, 1982). In some studies, a significant relationship between hearing impairment and depression is found to exist.

Inappropriate placements in a home for the aged or nursing home may take place because it is considered unsafe and undesirable for hearing-impaired persons to remain in their own homes. People are in danger if they cannot hear the telephone, the smoke alarm, the doorbell, the knock of the Meals-on-Wheels' volunteer or the VON nurse, etc.

As well, everyday pleasures such as watching television, going to the theatre, attending church, playing bingo or bridge, and chatting with friends become difficult for the hearing-impaired.

Hearing loss can be a real obstacle to a productive and satisfying life. The need for early recognition and management of a hearing loss is thus important.

5. HELPFUL HINTS AND TECHNIQUES FOR LIVING WITH HEARING LOSS

The hearing-impaired can be helped in a variety of ways. The following section discusses the questions of hearing aids, assistive devices, accessibility, aural rehabilitation and financial assistance.

5.1 HEARING AIDS AND ASSISTIVE DEVICES

People with a suspected hearing loss should have their hearing tested by a qualified person. It is recommended that a person see a physician for a medical examination. If the doctor determines that the condition is not medically correctable, the person should then see an audiologist or a qualified person trained in conducting hearing tests and hearing aid evaluations. A person should purchase a hearing aid only after the

professional has recommended an appropriate one from the hundreds of makes and models available. No two persons have exactly the same hearing loss. The importance of selecting the correct hearing aid cannot be overemphasized.

Many hearing-impaired seniors can be treated, after adequate evaluation, by means of assistive devices. Yet, the unsatisfied need for these among the hearing-impaired is reported to be greater than for any other category of disability. In addition, the technology that is widely available does not always meet the needs of seniors. Only 28% of those with hearing disabilities use an assistive device. Another 13% report that they need such an aid but do not have one because of its cost (Secretary of State, 1986).

Counselling services or independent living skills training can also help seniors and their families in coping more effectively with the activities of daily living. Concrete and direct assistance could help caregivers to ease the burden of caregiving.

Adapted housing and specially designed environments with technological aids can also play a major role in supporting the autonomy of seniors with hearing impairment.

Many hearing-impaired people stop attending theatres, places of worship and meetings or lectures because they can no longer hear clearly enough to derive any benefit or enjoyment from such activities. A good assistive listening system solves these problems.

Pursuant to the National Building Code, beginning in 1990, all new buildings with places of assembly--theatres, lecture halls, meeting rooms--over 100 square metres must have an Assistive Listening System for hard-of-hearing people.

Specialized sound systems make it possible for hard-of hearing people to participate once again. These systems bring the voice of the speaker directly to the ears of the hard-of-hearing person and blocks out unwanted distracting background noise.

Many hard-of-hearing people find hearing aids very helpful, particularly in one-to-one or small group situations. However, hearing aids do not function well over great distances as they pick up all sounds, not just the signal which the hard-of-hearing person wishes to hear. If there is background noise, the hard of- hearing person will have great difficulty with a hearing aid.

Many hearing aids have a telephone or T-switch which allows the hearing aid to pick up sound from the magnetic field produced by many telephones. The T-switch on the hearing aid can also be used with devices such as Infrared or FM systems. The receiver is used with a silhouette or a neck loop, both of which produce a magnetic field to be picked up by the T-switch. The combination of using a device with the T-switch on the hearing aid provides the user with more amplification.

Some hearing aids now come with audio-input capability. This allows devices including FM and Infrared receivers to be directly plugged into the hearing aids. Audio-input provides the best coupling with minimum loss of sound quality.

5.1.1 REQUIREMENTS FOR A GOOD LISTENING SYSTEM

A good listening system should offer the following features:

- It covers all of the seating area.
- It can be used by people who: have hearing aids with a T-switch, with audio-input, without T-switches or audio-input, or by people who do not have hearing aids.

- The system's receivers have sufficient volume or gain so that hard-of-hearing people with hearing impairments of varying severity can benefit from them.
- The system does not interfere with the listening enjoyment of others.

5.1.2 THE LISTENING SYSTEMS AVAILABLE

There are two systems available at the present time which meet all these requirements: the FM and Infrared Systems.

The **FM (Frequency Modulation) system** consists of a transmitter and one or more receivers. Sound is fed into a transmitter and converted into designated radio waves. These waves are sent out covering the entire seating area. There are two types of transmitters available with the FM system; one for personal use called the personal FM transmitter, and one for large groups called the auditorium or room system. Special wireless receivers worked by individuals pick up the radio waves. This can be used with or without hearing aids.

The auditorium systems are often permanently installed but can easily be removed. The personal system is extremely portable. There are no seating restrictions. The receiver will pick up the message up to approximately 100 metres.

Some advantages and disadvantages of the FM systems are:

- Good sound quality.
- Can be used with or without a hearing aid.
- The personalized FM system does not require any special installation and is easily portable. The auditorium system is very easy to install.

- The frequency range for the FM system has been set aside for use with hard-of-hearing people to prevent interference. Different channels in this range are available to allow several rooms to use the same equipment within the same facility.
- Narrow Band FM allows more channel selection than Wide Band and is less susceptible to interference.
- FM can be used outdoors.
- FM waves can go through walls so there can be some restriction in privacy.

The **Infrared System** consists of one or more transmitters and receivers. Sound is fed into a transmitter and converted into invisible light waves. These waves are sent out via an emitter or emitters filling the entire seating area. Special wireless receivers worn by individuals change the light back into sound to be directed into the ear. For people with hearing aids with T or T/M switches, special receivers which "clip on" are used with a neck loop or a silhouette that is placed between the hearing aid and the head. For people with hearing aids with audio input, the same receivers as for people with hearing aids with T-switches apply but they are used with an audio-input cord and boot connected into the hearing aid. For people without hearing aids or with hearing aids without T-switches, special headset receivers are available. Systems for large areas are usually permanently installed. A small portable system is available for use by individuals and for small listening areas.

There are no seating restrictions inside the room that contains the Infrared transmission. The Infrared light rays DO NOT penetrate walls and are maintained within the enclosed area.

Some advantages and disadvantages of Infrared systems are:

- Good sound quality.
- Can be used with or without a hearing aid.
- The auditorium system is easy to install.
- Infrared light remains inside the room ensuring privacy and non-interference from one room to another if several rooms have the same equipment.
- The auditorium system is not readily portable.
- Infrared cannot be used outdoors.
- The transmission may be vulnerable to high levels of extraneous light.

There are two other systems in use, namely the loop system and the AM broadcast system, which do not meet the requirements for a good assistive listening device.

5.2 ACCESSIBILITY

Day in and day out, deaf and hard-of-hearing people deal with barriers to communication. These barriers arise in a world where half of our business is conducted on the telephone; where emergency systems depend solely on sounds; where security systems make buildings inaccessible for those unable to use an intercom; where paging systems and most public announcements in terminals and on board public transit vehicles depend solely on sound; where few public theatres and halls make provisions for hearing aid users.

Listed below are suggestions that would help to make public facilities and services accessible to the hard-of-hearing.

5.2.1 VOLUME CONTROLS AND COMPATIBLE TELEPHONES

Many hearing aid users find that they can hear better over the telephone by using the T-switch on their hearing aids. The T-switch picks up the magnetic field produced by the RDA receiver (magnetic field conductive receiver) of many telephones. Unfortunately, not all modern telephones produce a magnetic field and are therefore not compatible with hearing aids. Bell Telephone provides compatible RDA receivers on request.

There are, however, devices such as Phonear, external telecoil, and telephone shoe that can be added to the phone to make them compatible with hearing aids.

Pursuant to a ruling of the Canadian Radio-Television and Telecommunications Commission, starting in 1990, all telephones manufactured or sold in Canada must be equipped with a small metal coil (RDA receiver), thus ensuring compatibility with hearing aids.

Volume controls can be added to the receivers of many telephones to assist hard-of-hearing people. It should be noted that a phone with a volume control will not necessarily be compatible with hearing aids. Volume controls are often used by people with normal hearing who work in a noisy environment.

The National Building Code (1990 revision) states that as of 1990, any building which has built-in furniture for telephones must ensure that the furniture has a level shelf large enough to take a TDD (Telecommunication Device for the Deaf). It is recommended that at least one telephone be equipped with a volume control on a receiver that generates a magnetic field compatible with the T-switch of a hearing aid.

Employees who are hard of hearing need telephones that are compatible with hearing aids and have volume controls. Business telephones that are used by clients should also be so equipped.

5.2.2 TELECOMMUNICATION DEVICES FOR THE DEAF (TDDS)

Deaf people rely on TDDs to communicate over the telephone. These devices, which look like typewriters, use the regular telephone and allow people to type back and forth over the phone lines. There must be a TDD at each end of the call.

Businesses that rely on the telephone to reach their customers and to receive orders from the public will see the efficacy of investing in a TDD. TDDs in all public buildings would also help deaf individuals. If you provide public information of any sort, a staff person who will use the TDD to communicate with deaf customers will need to be trained.

Transportation terminals, department stores, hospitals and many businesses have purchased TDDs and they note that deaf people are using more of their services because they are able to communicate with the use of the TDD.

In May 1987, Bell Canada began its Bell Relay Service (BRS) a 24 hour, 7 day-a-week relay service all over Ontario and Quebec. Similar services exist through the phone companies in British Columbia and Saskatchewan, and in the city of Edmonton. TDD users who want to call hearing people and hearing customers who want to contact TDD users can call BRS in English or in French. BRS is a free service.

5.2.3 VISUAL ANNOUNCEMENTS

Public announcements need to be augmented with visual displays, much like the ones used in the subway stations or like the TV screens used in airports. The visual announcements will complement the spoken message and will be appreciated by hearing people as well as people with a hearing loss. If a facility uses a cash register, a visual display accommodates the hard-of hearing and deaf people. Many frustrations are alleviated.

Without an easily visible display, customers have to rely on hearing the sales clerk to give them the total.

5.2.4 SIGNAGE

All public buildings need to have clearly printed directions so that deaf or hard-of-hearing individuals do not have to struggle to ask for directions. Clearly printed directions would include floor plan layouts, signs on walls indicating directions to various offices, and maps with helpful notes to assist in finding the way. Good signage is a boon to everyone.

5.2.5 PRINTED INFORMATION

Information readily available in written form such as schedules, admission prices, store hours, etc., is most useful for deaf and hard-of-hearing people. The written form could be pamphlets, posters or billboards. Good visual information is always useful as well for hearing people.

5.2.6 SIGN LANGUAGE AND ORAL INTERPRETERS

Sign language interpreters are fluent in American Sign Language and English, or Langue des Signes du Québec and French. They function as a communication bridge between deaf and hard-of-hearing people who need to communicate.

Oral interpreters facilitate communication in group situations where the deaf or hard-of-hearing individual uses lipreading to understand conversation. The oral interpreter silently mouths the words of the speaker, changing them where necessary to synonyms that are more visible on the lips. Public meetings of all kinds can benefit from using interpretation.

5.2.7 SMOKE AND FIRE ALARMS

Fire alarms and smoke detectors and other audible warnings in all public places should be equipped with flashing lights. Visual alarms should be installed particularly in areas such as washrooms where people are in isolation. These devices would ensure that people with any degree of hearing loss would be aware of any emergency when it happens.

5.2.8 LIGHTING

Good lighting is essential to facilitate lipreading and signing.

5.2.9 ELECTRICAL INTERFERENCE

Anti-static treatment of carpets and increased humidity will help reduce electrical interference which can adversely affect hearing aids.

5.2.10 CAPTIONING

Many TV programs are now "closed-captioned". This means that if a closed-captioned decoder is attached to the TV, these programs will print out the spoken words in the form of captions on the screen. Hotels, motels, libraries, trade shows, etc., do not often provide decoders. Informational or promotional material presented at conferences, trade shows, etc., can benefit from "open captioning". With open captioning the spoken word is printed on a screen without the use of a "decoder".

5.2.11 STAFF TRAINING

All the above suggestions can be greatly enhanced with staff training to develop awareness of the problems of hearing-impaired people and some understanding of their areas of

difficulty. The Canadian Hearing Society has a video, "One to one", which can assist with staff training.

5.2.12 THE INTERNATIONAL ACCESS SYMBOL - HEARING IMPAIRMENT

It is suggested that this symbol be used to identify easily any building or special areas inside the building, so that deaf and hard-of-hearing people know where assistance is available. Special accessible areas in a building may include telephone stations, booths, reservation/information counters, announcement areas, places of assembly and any other areas in the building that are accessible to the deaf and hard-of-hearing people. The type of service provided can be indicated below the access symbol.

5.2.13 DEVICES WITH TV AND RADIO

Finally, other technical devices are available which can make the television more accessible for both deaf and hard-of-hearing people. Most of these will also work with radios and stereos. The technical devices program of the Canadian Hearing Society can provide information on these devices.

5.3 AURAL REHABILITATION

Hard-of-hearing people need extra help to adjust to their handicap. Aural rehabilitation helps provide this extra support. It teaches people about their hearing and hearing loss and what they can do to manage in situations where their hearing loss creates communication difficulties. They learn speechreading, listening skills, positive coping strategies to use in different listening situations and they learn about hearing and communication aids. Depending on the degree of hearing impairment and the onset of hearing loss, aural rehabilitation may also include speech and language therapy,

voice maintenance, and/or auditory training. It may also involve the selection of an alternate communication system such as sign language.

Some tips can help to facilitate communication between hard-of-hearing persons and hearing persons.

A hearing person who wants to communicate with a hard-of-hearing person should:

- Get the person's attention before starting to speak.
- Not put obstacles in front of his/her face.
- Not have objects in the mouth, such as gum, cigarettes or food.
- Speak clearly and at a moderate pace.
- Use facial expressions and gestures.
- Give clues when changing the subject.
- Rephrase when not understood.
- Not shout.
- Avoid noisy background situations.
- Be patient, positive and relaxed.
- Talk to a hard-of-hearing person, not about him or her.
- When in doubt, ask the hard-of-hearing person for suggestions to improve communication.

A hard-of-hearing person who wants to communicate with a hearing person should:

- Avoid areas that are poorly lit and very noisy.
- Anticipate difficult situations and plan how to minimize problems.
- Tell the person how to best talk to him/her.
- Pay attention to the speaker.
- Look for visual clues to what is being said.
- Ask for written clues of key words, if needed.
- Provide feedback as to success or failure to understand.
- Provide feedback to the speaker by saying how well he or she is doing.
- Not bluff.
- Arrange for frequent breaks if discussions or meetings are long.
- Try not to interrupt too often.
- Set realistic goals about what can be expected to be understood.

5.4 FINANCIAL ASSISTANCE

Some provinces, such as New Brunswick, Ontario, Saskatchewan and Alberta have programs which cover at least a portion of the cost of hearing aids for all seniors. Hearing aid manufacturers offer a 30-day trial period to clients with the option of a

refund if they are not satisfied with the performance of the new aid. A handling fee is charged however. Seniors who are eligible for social security benefits likely obtain funding in all provinces. Assistive listening devices are not included. Exact information can be obtained from provincial ministries of Health or Consumer and Commercial Relations.

CONCLUSION

Over 10% of the general population suffers from some degree of hearing loss. The percentage rises to approximately 50% for the 65+. Hearing impairment can be a major obstacle to the quality of life. Early recognition and management of a hearing loss is important for everyone. Many surgical and technological advances can now come to the rescue.

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LIVING WITH SENSORY LOSS :

TOUCH

by

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National Advisory Council on Aging

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INTRODUCTION

According to the dictionary, five sensations are associated with touch: contact, pressure, heat, cold and pain. As if this were not impressive enough, changes also occur with aging.

In this paper, we will discuss the physiological and social aspect of touch before looking into changes that are liable to occur with age. The consequences of disturbances in the sense of touch for day-to-day activities will then be presented, and we will offer suggestions on how safety can be enhanced in moving about or for people at risk.

1. TOUCH: PHYSIOLOGICAL AND SOCIAL ASPECT

Tactile experience begins very early in humans. While still in the embryonic stage, the foetus experiences the pressure and stimulations of the amniotic fluid. These stimulations are translated, transformed and processed by the somato-sensory system. This system is made up of various receptors--the Meissner's corpuscles located in the skin's surface--that provide information on temperature, textures, pain, etc., and are particularly responsible for the receiving of tactile messages. These messages are transmitted through the spinal cord to the central nervous system.

Through touch, human beings may develop a whole non-verbal language. Non-verbal exchanges make it possible to communicate our attitudes and our emotions. Tactile contacts may, however, be perceived differently according to culture, sex, age and social status. In our North American society, only certain types of touch--for example, the handshake, the embrace--are acceptable in social exchanges. This inhibition is linked to cultural taboos which, in the past, were promoted by religion, social standards and values. Sexual and socio-cultural taboos are passed down from generation to generation, with the result that people fear touching one another, for

fear of having their gestures negatively interpreted by others. N'guyen et al (1975) and Hollender (1970) explain that women consider the touch of a person of the opposite sex as an expression of friendship, warmth, love, comfort and protection. Women are more receptive to tactile contact from unfamiliar people than men, who fear invasion of their territory if no prior justification for the touching is offered (Sussman and Rosenfeld, 1978).

Interpretation of any message by the brain is complex and even for scientists, it remains extremely obscure.

2. THE POSSIBLE CHANGES WITH ADVANCING AGE

As people age, some changes related to touch are liable to occur. (See Appendix I.) Laganière and Berthelet (1984) report that sensory deficiencies may alter the reception of messages in the elderly. They may experience decreased sensitivity of receptors as far as touch, temperature, vibration and pain are concerned. This decreased activity may affect their ability to distinguish different stimuli or may reduce their reaction time. For example, the elderly may have difficulty differentiating coins or buttons, may have difficulties with fine dexterity such as catching or picking up small objects. Slower reaction to stimuli may result in injuries or burns, because the stimulus is not perceived quickly enough. Slowed down reactions to toxic products--such as paint, solvent or cleansing products--or high temperatures may result in serious health injury to the elderly.

2.1 HEAT SENSITIVITY

With advancing age, blood circulation to the capillaries diminishes, thus predisposing the elderly person to feeling chilly, and mainly making her more vulnerable to temperature changes. Air conditioning may be a source of real discomfort to the elderly. Ceiling rotary fans are much more recommendable for

the elderly because they do not bring about sudden temperature change.

2.2 VIBRATORY SENSITIVITY

Yurick (1984) reports that loss of sensitivity to vibration seems to occur at around 50 years of age and seems to be much more significant in the lower limbs than in the upper. This loss appears to be linked to imperceptible changes in the blood circulation to the legs or the spinal cord.

2.3 SENSITIVITY TO PAIN

Decreased sensitivity to pain seems to be the result of degeneration in the receptors and central nervous system. Definition of pain, however, is highly subjective and there are great variations between individuals. Research on pain therefore presents difficulties in controlling and interpreting all of the variables such as, cultural values, individual experiences and personality variations.

The experience of pain provokes anxiety and may increase the feeling of despair when pain becomes chronic. The reduction in the level of sensitivity to pain among older people leads to a low level of reporting. Therefore, diagnosis is more difficult. Older persons' response to analgesic treatments may also be very different, due to physiological changes in metabolism and elimination. Retention and accumulation of analgesics lead to a medicinal intoxication. The most frequent symptoms are of such intoxication are confusion, depressed respiration, altered heart rate and increased liver enzyme levels. These manifestations may vary according to the medication involved; it is therefore wise to consult a physician or pharmacist.

Early signs of decreased sensitivity related to cellular aging are extremely difficult to detect. The changes are gradual

and the individual develops adaptive mechanisms which attenuate the problem.

Yurick et al (1984) consider that more than half of the elderly population suffer from some degree of various sensory losses. The actual number of people specifically suffering from touch deficiencies, however, is not known yet.

Certain illnesses of neurological, muscular, cutaneous or osteo-articular origin greatly affect the sense of touch. These illnesses--for example, multiple sclerosis, muscular dystrophy, arthritis, rheumatism, psoriasis, eczema--may result in deformations, pain, skin lesions and marked losses of tactile sensitivity. Certain disturbances such as paraesthesia (abnormal sensations such as formication, itching or burning) or paralysis (loss of motor function of part of the body, most often due to central or peripheral lesions of the central nervous system) upset the general daily living activities of an individual. Individuals experiencing these disturbances are considered to be at high risk of injury of various sorts because they are deprived of the normal defence mechanisms that touch provides. Thus, a paralysed person may not feel the burns caused by a cigarette butt. The causes of these various illnesses which affect the sense of touch are not yet known, or are only partially understood. Treatments vary and consist mainly in specific assessments of the degree of the illness and in attenuating the symptoms.

The sense of touch is not affected solely by aging or disease. Solitude and isolation may also result in great damage to all of the bio-psycho-social components of the human being, including difficulties in tactile and vibratory perception.

The need to touch or to be touched is necessary for human physical and mental health (Montagu, 1971). Humans who are deprived of touch stimuli--in cases of a prolonged isolation for

example--are subject to various reactions such as anxiety, behavioural modifications which may be translated into an inability to think and resolve problems, affective and perceptual disturbances, hallucinations, aggression, somatization and disorientation in time and space (Ebersole and Hess, 1985). Sensory deprivation in every day life, however, does not necessarily lead to such serious disturbances. The problems related to touch mainly involve annoyances, discomfort and minor accidents.

3. THE CONSEQUENCES OF DISTURBANCES IN THE SENSE OF TOUCH FOR DAY-TO-DAY ACTIVITIES

Decreased sensitivity may result in difficulties in perceiving different textures of fabrics or objects. Thus an older person may hurt her skin when using rough paper, for example sanding paper, before she even notices it. She may pick up a fabric of lesser quality because she has difficulty in distinguishing fine and soft textures. She may not perceive as well as before a friendly embrace or gesture.

As for temperature, decreased receptor efficiency may lead to accidents such as burns (for example bathing in water that is too hot or not noticing that a cigarette has burned down to the fingertips before pain settles in).

As for vibration, the elderly person may have difficulty keeping his/her balance on escalators and moving walkways, on slippery floor or icy steps, because the receptors transmit messages less well. The elderly person will, however,

the elderly person refuses to use a cane, a stick can be used when walking outdoors or an umbrella when shopping.

To avoid falls in the house, rubber mats and handhold bars may be installed in the bathroom and wall to wall carpeting is safer than loose rugs.

3.2 THOSE AT HIGHER RISK

Assessment of the sense of touch constitutes the first step in planning a help or care program for an older person with tactile deficiencies. Such an assessment should address levels of sensitivity, reactions to heat and pain, vibratory and proprioceptive senses and perceptions of touch. Very simple tests (See Appendix II) may be done which guide family or caregivers in the planning of care and activities (See Appendix III).

It must be noted, however, that the disabled bed ridden elderly must be moved frequently, for example every two hours, to prevent reddening of the skin or bedsores. These individuals may not always be aware of the discomfort occasioned by a prolonged stay in one position. Massages of pressure points (shoulders, elbows, hips, ankles) improves blood circulation. Care must be taken to ensure that the skin is not reddened. In addition, if ice or hot packs are required, they should be constantly

monitored. If the skin is reddened, the packs must be immediately removed.

CONCLUSION

People who live alone and have been isolated for a long time can have their sense of touch restimulated with progressive exercises of perception and palpation of different fabrics (wool, silk, velvet, fur, etc.), of textures (wood, modelling clay, etc.) or of different shapes (marbles, tokens, boxes, etc.) The presence of a docile animal offers this whole range of stimuli while at the same time meeting the needs of affection and sometimes, security.

Human tactile contact, however, remains one of the most precious contacts and, in general, the elderly like to be touched by others. Psychologically speaking, gestures of affection play on the feelings of well-being (Durr, 1971), self-esteem (Sylverman et al., 1973), verbalization of feelings (Aguilera, 1967), anxiety levels (Mc Corkle, 1974), attention span and spatial orientation (Langland and Paniccuci, 1982).

Touching should, however, be used judiciously with the elderly, especially those with significant cognitive or psychological handicaps. In such cases, touching should be gradual, starting with hand holding and progressing to touching the forearm, the shoulder and the face. If the non-verbal

relationship proves highly significant, it is important to maintain it. If this is not possible, care must be taken to reduce the non- verbal relationship gradually to avoid triggering excessive emotional reactions. The loss of a significant relationship may trigger a depression in the elderly or make them even more confused.

Moreover, some people simply do not like to be touched and their rights must be respected (Saulnier, 1988). Ernst and Shaw (1980) believe that the elderly generally perceive not being touched as a sign of personal and social rejection. They add that touching contributes to personality development, reinforces interaction, reduces isolation and makes it possible to acknowledge the individual's personhood.

APPENDIX I -- BIO-PHYSIOLOGICAL CHANGES	
1	Differences between individuals Decreased sensitivity of the following receptors (Meissner's corpuscles): <ul style="list-style-type: none">• tactile• thermal• pain• vibration
2	Altered ability for fine discrimination (feet-hands) Decreased reaction and response time to internal stimuli (pain) and external stimuli (temperature) Decreased sensitivity to vibration (accentuated in lower limbs) Decreased sensitivity to temperature (in extremities) Hypothermia and hyperthermia more frequent
3	*Sensitivity to pain: lessened in some cases, heightened in others

*There seems to be disagreement among the authors on this. However, factors such as personality, culture and past experiences exercise an influence on pain mechanisms.

APPENDIX II -- METHOD OF ASSESSMENT	
<p>Data gathering --- Guide in Assessing Touch</p>	<p>Tactile sensitivity</p> <ul style="list-style-type: none"> • response to light touch, pointed or flat object • identification of objects by touch <p>Temperature sensitivity</p> <ul style="list-style-type: none"> • response to heat or cold <p>Sensitivity to pain</p> <ul style="list-style-type: none"> • response to pain, intensity, location, irradiation, duration • treatment used to relieve pain <p>Vibratory sensitivity</p> <ul style="list-style-type: none"> • response of extremities to vibratory stimuli <p>Touch - Means of communication</p> <ul style="list-style-type: none"> • interactive response, in touch with the environment
<p>Subjective assessment of client</p>	<p>Perception by the elderly person of any change relative to touch</p> <ul style="list-style-type: none"> • difference, effects of change on everyday living • means of compensation, adapting
<p>Sensory Function Tests</p>	<p>Tactile test</p> <ul style="list-style-type: none"> • use of a "Q-Tip" to lightly touch body surface, evaluation of sensitivity <p>Assessment of pain</p> <ul style="list-style-type: none"> • needle placed on various points. Discrimination between flat and pointed end. Assess degree of intensity of pain <p>Sensitivity to temperature</p> <ul style="list-style-type: none"> • Apply tubes of hot and cold water to various parts of the body <p>Evaluate reaction time and duration</p> <p>Sensory Perception</p> <ul style="list-style-type: none"> • the individual alternatively raises and lowers thumb and great toes and names position taken • the individual closes the eyes and identifies an object placed in the hand (key, coins, elastic, etc.)

APPENDIX III -- CHOICE OF INTERVENTIONS	
Prevention and Assistance	<p>Prevent injuries</p> <ul style="list-style-type: none">• shoes too tight• lack of mobilization• hot water bottles, heating pads, bath water <p>Increased need to be touched in times of stress, illness, boredom or depression</p> <ul style="list-style-type: none">• need of signs of attention, caresses, sensory stimulation, particularly among those with skin lesions, infections or burns or those undergoing radiation therapy• stimulate contact between individuals (handshakes, friendly tap on the shoulder, walking arm-in-arm, dancing, etc.)• assist in identifying and handling objects or foods<ul style="list-style-type: none">• eating• handicrafts• other <p>Identify degree of receptivity to marks of attention shown to the elderly person, and provide in "individualized dose"</p> <ul style="list-style-type: none">• frequent mobilization when proprioceptive deficits are present (every two hours or more often as required)• therapeutic massage (relaxation, comfort)
Rehabilitation	<p>Sensory stimulation</p> <ul style="list-style-type: none">• differentiate fabric, metals, foods, etc., using games or structured activities
Physical Surroundings	<p>Varied texture in environment</p> <ul style="list-style-type: none">• rough-textured fabric on bannisters, chairs or cushions in leather, wool, cotton, silk, etc. <p>Avoid synthetics such as plastic utensils, which are too light and hard to handle.</p> <p>Adapted utensils may be purchased in specialty stores.</p>

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