Notes of a Kolff-Watcher

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In academic life or scientific research, the traditional Festschrift is the highest form of recognition and – in most cases – the most genuine and sincere tribute. Most contributions to a Festschrift are written by peers and colleagues of the man to be honored, preferably by former students, who themselves are now in recognized positions of scientific or academic eminence. In this endeavor, they delve back into their linked past to illustrate how the special spark which distinguished their teacher has been passed on to them and has resulted, in turn, in further productive achievements which followed and emanated from the original contribution of the honoree, in a continued and broadening cascade.

Would that this writer could find himself in a similar position: it would have meant that he had had the extraordinary luck to be associated with Pirn Kolff during his early, formative years, that indeed some of the latter's inspiration might have rubbed off on him and that he, too, could point with (hopefully well-disguised) pride to follow-up accomplishments in ... here's the rub ... in whatV. – in innumerable areas of medical, surgical, scientific, engineering, socioeconomic, artistic and plain cerebral endeavors... and nearly five hundred publications testify to this multifaceted spirit of enterprise and innovation.

That is what Pirn Kolff is really all about. He is that rara avis that has to perch in more than one tree of knowledge to find satisfaction and pursue his many talents and inclinations. Just as Einstein seemed more pleased with his mastery of the violin (a mild source of impatience when colleagues wanted to talk physics on social occasions), Pirn Kolff, when quizzed about his achievements related to dialysis and artificial kidneys would tend to change the subject to his current work with artificial hearts and the latest record broken by a strong-willed calf equipped with a sturdily beating Kolff cardiac prosthesis to achieve a longer life span than its predecessors. At other times, he would change his focus of attention, forsaking previous achievements about which the unwary visitor might exhibit awe and interest, and would steer the conversation (and the visitor) to sophisticated ongoing experiments in his Division, involving far-out electronic wizardry, to provide man-made sight to patients who have lost their natural vision. Or, perhaps, he would show you a bronze casting of the first artificial kidney used successfully in man and developed by himself, derived from a sculpture which he himself had created.

Since the writer was not a student or co-worker, but met Pirn Kolff at a later point, he cannot entwine the accomplishments of the student with those of the teacher to be honored on this occasion; rather, he will continue jotting down his notes of a Kolff watcher.

If Nobel prizes in physiology and medicine were given for clinical innovations that saved lives – Kolff would have received his either soon after inventing the first practical artificial kidney which saved human lives in the late 1940s or during the late 1970s and beginning 1980s when

dialysis had become a universal household word. Throughout the world, literally 140,000 individuals with terminal renal failure now continue to live with the aid of artificial kidneys which he had invented 30 years earlier. Without artificial kidneys, there would have been no development of renal transplantation. Dialysis is essential to maintain uremic patients until a suitable organ can be found, and to bring them to a physiologic state compatible with the demands of major surgery; moreover, dialysis functions as the safety net needed to save the patient if the grafted organ ceases to function because of rejection or other misadventures. Thus, another estimated 80,000 lives have been saved or prolonged throughout the world because of Kolff's successful perseverance in tinkering with artificial kidneys in the basement of a Dutch hospital occupied by the Germans during World War II. Moreover, additional tens of thousands of patients have survived acute renal failure after major surgery trauma, shock and burns, and hemodialysis has been the lifesaver in countless cases of accidental and induced poisoning and drug overdosage since Pirn's panacea has become an accepted part of the armamentarium of modern medical practice.

Nobel prizes are given primarily for basic advances in biomedicine, but there is hardly any other prestigious award that he has not received. This spectrum of recognition ranges from the Gairdner Prize through the prestigious Harvey Prize (of which he was the first recipient in medicine) to being Commander of the Order of Orange-

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Nassau by appointment of Her Majesty Queen Juliana of the Netherlands, his country of origin. Among this vast array of honorary degrees of Doctor of Medicine, Doctor of Science, the Phillips Memorial Award of the American College of Physicians, and the Golden Plate Award of the American Academy of Achievement, there is one prestigious prize which Pirn Kolff won, but which had never been awarded officially, nor was he aware of it. For a description of this Presidential Prize for Outstanding Achievements in Innovation, its history and ultimate fate, the reader is referred to Science 183: 938 (1974).

In the early 1970s, the White House announced the creation of six new Presidential Prizes for Innovation. One of these was to be given for an outstanding innovation in medicine, the others in the sciences, technology, and entertainment. Each winner of an award was to receive \$50,000 and the prizes were to be awarded with all due pomp and circumstance and nationwide television coverage in the White House. A series of outside review panels had finally arrived at a choice of 5 individual winners of these awards and 2 winners who were to share equally in the sixth. 10 years later, the list of award winners is still highly impressive: Backus of IBM for inventing the computer language FORTRAN; Knipling of the US Department of Agriculture for developing nonchemical means of controlling pests; Rosen of Hughes Aircraft for inventing the synchronous satellite; Ruben of Ruben Laboratories for inventing the mercury tube battery and other inventions in the development of modern radio; Cooney and Morrisett, codevelopers of the children's TV program 'Sesame Street', – and Kolff, of the University of Utah, for inventing the artificial kidney and developing other artificial organs. In preparation for the occasion, and unbeknownst to Kolff, a facsimile of the original 1945 model artificial kidney invented by Kolff was prepared for delivery to the White House together with a modern contemporary counterpart, to be used as background during the award by the President of this first Presidential Prize for Innovation in Medicine.

Somehow, unforeseen circumstances intervened between Presidential elections, the war in Viet Nam, and the forerunners of Watergate. The project was cancelled and never heard from again. Luckily, this was not a disappointment for Pirn Kolff because he did not even know at the time that he had been chosen for the award. Deservedly, other circumstances intervened and within days, he received the first highly ranked, very prestigious Leo Harvey Prize in Medicine from the Technion University in Israel. Proving the proverb that a bird in the hand is better than two in the bush, the Harvey Prize carried with it an award of \$35,000, not at all a consolation prize since Kolff had not yet been officially notified of winning the short-lived \$50,000 Presidential Prize for Innovation.

With the Harvey Award came an invitation for a brief stay in Israel, and it is characteristic for Kolff, the man for all seasons, that during this 4-week stay (right after the Six-Day War) the visiting biomedical scientist developed a plan for the resettling of Arab refugees which bore the usual maker's mark of Pirn Kolff – it was concise, lucid, logical, practical, and bore the promise of feasibility. It was published by the Technion and sent to Prime Minister Golda Meir.

The problem with contributions to a Festschrift is that they have no logical beginning nor end. Where do you begin counting the achievements? In Pirn Kolff's case, should it be when he established two blood banks during World War II in Holland for which he received the Landsteiner Silver Medal from the Netherlands Red Cross in 1942 – or do you start counting slightly later when he began experimenting with prototypes of the first artificial kidneys meant for application in man? And, where do you end! As long as the honoree is still active, there is no finis to his contributions, and there is no limit to the follow-through from students and associates who have been stimulated by him... and thus, there is no predictable ending. We can safely anticipate that Pirn Kolff, the complete Mosaic phenotype of pioneer-physician-surgeon-inventor-engineer-artist-economist – organizer -writer and raconteur par excellence will continue to pursue any artificial organ or other hapless problem that happens his way whenever he can see a chance for a solution or a future practical application for the benefit of mankind.

The writer's choice for a conclusion is made easy by two favorite Kolff mementos in his own office. One is a modest soft-cover book

long out of print and now a collector's item: *New Ways of Treating Uraemia* written by Kolff the biomedical innovator and published in London in 1945 soon after he brought to England from Holland the first functioning artificial kidney. The other hangs on the office wall; it is a well-known picture of a medieval hospital scene depicting an early surgical operation. Somehow it also shows that the patient who is receiving the crude ministrations of the surgeons in medieval garb is connected to a Kolff artificial kidney anno 1945. The picture was crafted with gentle humor by Kolff the artist and bears a hopeful Christmas message. It completes another facet of Kolff the man.